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7

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Photo - Thresh Kapoor

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Red Giant Flying Squirrel

Photo - Bhagat Singh



Crimson Sunbird *Aethopyga sipagaja*

Photo - Bhagat Singh

Editorial

The Vanishing Wildlife

Dr. S.N. Khattri* and Dr. S.P. Singh**

The aesthetic concept that all animal species have an inherent right to live and that their presence is of an aesthetic value to man has gradually evolved from the first five steps of wild life management. How can one put a price tag on the thrill of seeing a tiger? — of being able to escape the bustle of modern living and enjoy the tranquility of nature? — of seeing the mysteries of nature revealed through the actions of her myriad of living creatures? The animal species can be seen in numerous zoos all over the world, but viewing them in their natural habitat gives greater meaning to the observer.

Wild life enjoyed in the past a measure of protection by virtue of the inaccessibility of the forest which sustained and sheltered it. The depredations of the forest tribes with their traditional bows and arrows nets and snares, drives and dogs, were hardly noticeable except on the fringes of the forest. Wild animals continued their uneventful existence until the turn of the 19th Century when the British appeared on the scene with their modern weapons and what was worse was their licentious lust for killing which passed for sportsmanship these days. The wild life of India had to contend with an attack on two fronts. Vast forest areas what provided a haven for wild life were given away for a song to enterprising adventures, for raising tea, coffee, rubber and rice plantations. The forest succumbed to the irresistible pressure of planters and local population and with it the wild life supported with its cover gone the wild life fell an easy prey to high velocity rifles and double bared guns in the hands of trigger happy hunters. The dawn of the 20th Century, witnessed a systematic destruction of wild life brought about by the opening up of the forest, the arrival of the obliquitous jeep and the invention of blinding flashlights. As the huge forested regions of the Indian subcontinent gave way to settlements and rice fields, its valuable assets of the colourful wild life were confined to constantly shrinking living spaces.

Unable to find a place for themselves, many species were driven to the verge of extinction. The protection to the wild life was enjoined as far back as the 3rd century B.C. by Emperor Ashoka. On his fifth pillar edict are inscribed names of birds, beasts, fishes, which were to be preserved.

The Indian lion, which for its bravery, invincibility and regal gait, inspired the priest, the poet, and the painter alike was wiped out of existence by the so called British sportsman of the East Indian Company. Upto the beginning of the 19th Century the lion stalked the Indus Plain and the central India Highlands covering an area of about 1/4 million sq.miles. By about 1865, the lion was well on the way out, despite repeated protests one reads in the sporting journals of the time. The lion today is confined to a small tract (550 sq.miles) viz. the Gir forest in Saurashtra, where according to census of 1968 are 170 lions approximately. Like most protected monuments of the country, the lion owes its existence to the foresight of Lord Curzon the celebrated viceroy of India, at the turn of the 20th Century. During the post-independence era a second home for the lion has been found in the Benares Division of Uttar Pradesh.

The hunting leopard (the Cheetah) followed suit. Once a pet of the Ruling Princes in their blackbuck hunts, it is now as dead as the dodo. Its unfortunate resemblance with the wily panther proved its undoing. India's tiger population, which numbered an estimated 40,000 at the turn of the century, is now down to a scattered remnant of 1,800. The Asiatic Two-horned Rhinoceros (*R.sumatrensis*) of Assam, and the Lesser one-horned rhinoceros (*R. sondaicus*) of the Sunderbans have gone. The great one-horned rhinoceros (*R. unicornis*) has been saved from the hunters of its horns, prized as valued aphrodisiac, by declaring it as a protected animal and nursing it in the Kaziranga Sanctuary in Assam, and Jaldapara Sanctuary in West-Bengal. In West Pakistan the days of the straight horned markhor are numbered. The Urial of the Punjab is likewise threatened. The Wild buffalo is no longer to be seen in areas to the east of the Godavari. The pink-headed duck is gone for good. The Monal, the tragopan and the peacock are still

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with us because a rigid control on the export of their feathers has been enforced. In India, the species which have already entered a critical stage of their existence are snow and clouded leopard, Indian wild ass, Kashmir stag, musk deer, Thamin – the brow antlered deer of Manipur, Pigmy deer and also birds — Great Indian bustard, Monal and white winged duck.

It is not sufficiently realized that once species, more particularly a gregarious one, begins to go downhill, its rehabilitation becomes extremely difficult. For once an animal species is gone, neither repentance nor all man's genius can bring it back. The game laws enacted sought control over poisoning, netting, snaring and pitting of animals and birds. A special act for the protection of elephants was also passed in the Forest act of 1927. Poachers have always been hard to apprehend and even hard to be convicted, punishment and penalties are adequate to prove deterrent. Prevention of killing for trade and profit constitutes the key stones of preservation. Trade in animal products has been put down with a heavy foot. The importance of protecting and preserving those remaining is being emphasized more and more as the world's increasing human population results in increased hunts of its wild life. Numerous societies throughout the world are striving to preserve these animals and to restore them to a remnant of their former number. Only with the interest and cooperation of the public, many species be spared from oblivion.

"We have a small planet, in astronomical terms a minor planet, which is the only home of man. We are threatening its life support systems, we are exterminating animal and plant species which are fellow crew members of our space ship — this earth we share. There seems to be a genuine responsibility resting on us, the only animal species capable of reasoned thought, and the only one with a conscience. There is surely an obligation to look to the future to the world our children and grand-children will inherit."

Appeal to Life Members for Donation

Due to price escalation the printing of "Cheetal" is becoming difficult. An appeal was made through a letter to Life Members to donate the Society and following members have been kind enough to send their donations mentioned against each :

1.	A.S. Negi	-	Rs.1000/-
2.	Prof. J.S. Bali	-	Rs. 500/-
3.	Mr. Rajeev Mehta	-	Rs. 500/-
4.	Mr. Bitta Singh	-	Rs. 500/-
5.	Dr. Prashant Singh	-	Rs. 500/-
6.	Mr. Mansoor Mazhar	-	Rs. 500/-
7.	Mr. Pankaj Shah	-	Rs. 500/-
8.	Mr. R.D. Sharma	-	Rs. 500/-
9.	Mr. G.M. Behl	-	Rs. 500/-

In addition to the above Mr. Bulu Iman has pledged to donate Rs.1000/- and Kr. Vikramjeet Singh and Mr. H.S. Rose have promised to donate in near future.

AN EARNEST APPEAL IS BEING MADE TO ALL OTHER LIFE MEMBERS AND OTHER MEMBERS TO DONATE GENEROUSLY TO THE SOCIETY THROUGH CHEQUE / DEMAND DRAFT IN FAVOUR OF HON. SECRETARY / PRESIDENT WILDLIFE PRESERVATION SOCIETY OF INDIA, DEHRADUN

A.S. NEGI

Letters to Editor

Dear Shri Negi,

This has reference to office letter dated 16.03.2010 forwarding the proceedings of the meeting held on March 14, 2010. Infact, it is quite difficult for the outside members to attend the general body meeting, whereas, the local and nearby members can easily attend such an important meeting. With faith in the executive, I have the following few points to make :

- ❖ Content wise, the Cheetal need serious attention. It needs to be more informative scientifically. The articles / research papers / news from other states should also form a part of it. Besides, it should have some very pertinent piece of information from international arena too.

- ❖ The measures proposed to improve the poor financial health of the society are quite good but it is generally very difficult to procure advertisements. Anyway, I will pay Rs.500/- for this cause sometimes in the near future.

- ❖ The move to have / shift society office at suitable place is also the need of the hour.

- ❖ The society will have a better face by having a regular President.

- ❖ Holding conferences / seminars / workshops is always a good idea / move but the real / practical outcome is generally less. Say for example, there have been numerous Fora where the issue of the "Raja of the Jungle" has been consistently discussed but the result is a definite decline of the Tiger population. Worries are expressed without any practical steps which could deliver positive results. Take care of the Tiger, the dog and other animals will automatically stand benefitted through continuation and survival of the food chain.

- ❖ The membership drive by Dr Rawat is praise worthy.

- ❖ I am willing to serve the society in any situation / way, which could be possible for an outside member.

Hope the next general body will attract more members than before. Good luck.

Yours Sincerely,

(HS Rose)

Dear Mr. Negi,

Thank you for the minutes of the General Body meeting of WPSI held last month and invitation to the General Body meeting to be held this month on 18th April. I will be unable to attend the meeting but will be sending a donation of rupees one thousand by a demand draft. I wish the meeting all success. I am sending a letter by post to Dr. J.S. Bali, c/o of your address which I would be thankful if you could forward it to him.

With warm regards,

Yours Sincerely,

Bulu Imam

Convener, INTACH Hazaribagh Chapter

Jharkhand

Hi Greetings,

Just to inform you that I am a life member of WLPSI, with registration No. UP/17/life, and got ur letter regarding ur annual general meeting for 18/04/10 yesterday and unfortunately couldn't attend today's meeting for this reason, please if possible can I and my brother who too is a life member be informed through mail of all the developments, meetings & workshops of WLSPI. Since we live in a village the postal system can't be relied upon, also is any thing planned in corbett this summer which as life members we can attend do inform us, with all the best wishes and support to the new board members and our continued support to WLSPI.

I will be sending my contribution towards the smooth publication of Cheetal always through cheque soon,
with best wishes to all at WLSPI.
Vikramjeet Singh & Samarjeet Singh
DIRECTOR
MUDFORT KUCHESAR
BULANDSHAR UP 245402
9837809999/9412227674

Dear Sir,

Coordial Greetings !

Thanks for your letter dt. 16.03.2010 informing about General Body Meeting to be held on 18th April, 2010 and sending the minutes of the GBM of WPSI dt. 14.03.2010.

All the matters discussed in this meeting and the resolution taken are appreciable and good initiations. The volunteerly services of Mrs. Purva Mehta for editing "Cheetal" are really acknowledged.

Sir, I will not be in position to join the GBM on 18th April, 2010 as the Univ. exams are at peak and it not possible to get leave.

With regards

Thanking you again

Yours

Dr. L.S. Rajpurohit

Assoc. Prof.

Animal Behaviour Unit,

Department of Zoology

J.N.V. Univ. Jodhpur (Raj.)

Dear Sir,

Apropos your notice dated 16.03.2010 for the general body meeting on 18th April 2010 it is regretted that I am unable to attend the meeting. However, I fully agree with the matters discussed in the meeting on 14.03.2010. Therefore, please excuse me and oblige.

With regards,

Yours Sincerely

J.P. Kotangale)

Wildlife Preservation Society of India has been doing excellent work under the able guidance of the illustrious members of the Governing Board.

But the sad fact is that we preside over a diminishing wealth of natural resources, including wildlife. Wildlife habitat is being destroyed. The major cause is the biotic interference of our rising population of humans and domestic livestock. This diagnosis has been repeated ad nauseum. Important thing is to eliminate totally the biotic intrusion of men and animals within limited areas of the National Wildlife Parks.

Prof. J.S. Bali

Former Professor of Soil and Water IIT Khargpur

Head SAWCRATC Dehradun

Presently, Patron of the Soil Conservation Society of India

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Indian Long - Billed Vulture (*Gyps indicus*)

Gregarious, frequently seen with other Vultures and Crows at carcasses. Common in drier parts of India (Rajasthan, Gujarat, most of Central India, South of Gangetic Plains). Habitat : open country, habitation, forest. Breeds on cliffs.

This species of vultures along with three other species of *Gyps* genus commonly found in Indian Sub continent in abundance have become highly endangered since last decade due to extensive use of Dichlofinac drug commonly used in domestic cattle. Nearly 95% of vultures of all these species have disappeared. This has lead to establishment of 4 breeding centres for these species in India.

MY CONTRIBUTION TO CORBETT TIGER RESERVE

A.S. NEGI*

Corbett Tiger Reserve fascinates me, like it would fascinate any nature and wild life lover. My first visit to Corbett was in the early sixties after my school examination. My stay that summer, with my elder brother who was posted at Dhikala as A.P.O. created in my tender heart a niche for forest, wildlife and nature. My subsequent visits strengthened my love for forest and wildlife. In those days, forestry operations were carried out even around the Dhikala chaur (grassland). I spent long hours almost everyday, sitting alone on a machan and observing wild animals and birds. I never got weary of watching these creatures.

Baiting of tigers for viewing and photography was a regular practice in those days. One day, while accompanying tourists for tiger sighting. I was put on a less important machan with a few staff of the park. We were lucky. Five tigers made a roaring appearance one after the other, just below the machan on which we were sitting, after a hanka (driving out the tiger by tame elephants from the dense grass cover). I was extremely excited at the sight of these magnificent cats. It was a lifetime experience, for I have not seen 5 tigers together in wild again until this day.

My interest in wildlife was sustained and further developed by my regular visits to Corbett even after I had joined the Indian Forest Service. It was a coincidence that my second posting as Conservator of Forests was as Field Director of Corbett Tiger Reserve from November 1989 to June 1994. The job was exciting but carried more challenge than excitement.

Corbett is one of the most beautiful and exciting protected areas in the world and has a history of more than 50 years of wildlife management. It was considered a heaven for mahseer anglers, nature lovers, bird watchers, peace seekers and genuine wildlifers. Being the pioneer National Park of the country, it was selected as the site to launch Project Tiger in 1973. It was thenconterminous with the Corbett National Park. A proposal had been submitted to the Chief Wildlife Warden (CWLW)U.P. in the early eighties, for the addition of 1100 km² as buffer but no action had been taken.

As Field Director of Corbett Tiger Reserve, I set out certain goals for its long term betterment. Some of the important achievements are being detailed below.

Extension of Tiger Reserve:

At the time I joined CTR as Field Director, the area of the TR was only 521Sq. Km. I felt that the spill-over of wild animals from the core area was not being properly managed in the surrounding buffer, the wildlife management status of the two areas being so different. I took it as a challenge to get the buffer areas included under the management of the Field Director, despite great deal of opposition from the Territorial Divisions. A series of meetings were arranged between the CWLC and the Principal Chief Conservator of Forests (PCCF) and finally, in October 1991, the entire 611 km² of Kalagarh Forest Division, 97 km² of the Ramnagar Forest Division and 89 km² of the West Tarai Forest Division were transferred under the charge of the Field Director. This included the prime elephant habitat of 301km² Sonandi Sanctuary of Kalagarh Forest Division, notified in 1987. The area of Corbett Tiger Reserve swelled to 1319 km² with three protection categories. Core Corbett NP – 521 km², Sonandi Sanctuary 301 km² and Buffer Area – 497 km². This extension of the Tiger Reserve has proved to be a boon for the long-term conservation of the tiger and elephant of this tract. Due to well managed and sufficiently large buffer, today CTR has the heighest density of tigers in its entire range in Asia.

RELOCATION OF VILLAGES:

Four villages on the southern boundary of the park, Dhara, Jhirna, Kothirao and Laldhang, with a total population of about 4000 were proposed to be relocated to new sites since early seventies. After the extension of the Tiger Reserve to include part of the West Tarai Division in the South, these villages came deep into the Tiger Reserve and had neither all-weather roads connecting them with the main roads nor electricity. There were volumes of correspondence and their shifting was always deferred due to one or the other reason. Even the villagers had differences among themselves which were difficult to sort out. As soon as I took over as Field Director, delegations of villagers came to me with their desire to shift to new location, because of the difficulties that they had to face in the form of wildlife damage and lack of development activities. I called a meeting of the villagers from all the four villages in June 1991, and it took me 6 hours to sort out differences between the villagers regarding the allotment of a particular piece of land in lieu of the present land. I was happy to have been of help in resolving the differences. After a lot of persuasion, Government of India agreed to pay for land development, shifting of household materials, building of an approach road, supply of drinking water, construction of huts etc. After more than a dozen meetings with the villagers, and pursuing the proposal at all stages, Dhara, Jhirna and Kothirao were finally shifted to their new locations by April 1994. Now, one can see the result of these abandoned village lands returned to the wilds again. The sites have become grazing grounds of wild ungulates, and one can see pugmarks of tigers and leopards and hear frequently alarm calls of deer from the Jhirna Forest Rest House. The villagers who are now settled on either side of Ramnagar-Kashipur road now have fertile irrigated land, their children can go to school and they don't have any conflict with wild animals. The proposal of Laldhang village which was processed separately due to certain technical difficulties did not come through during my tenure and part of the village still remains at Laldhang despite the forest land having been cleared and allotted to them. I am sorry for the inhabitants of this villages who could not be relocated. Let us hope that the dream of the people of Laldhang village will also come true one day and they will live in a place where there won't be any conflict with wildlife. We also hope that this chunk of land will be returned to the tiger.

BUSTING OF A POACHERS GANG:

Rains had set in early July in Corbett Tiger Reserve. On 14th July 1990 the field staff of Kalagarh Range while on their routine patrolling found human footprints in a nullah deep in the core area of the park. They suspected them to be of poachers and made secret enquiries in the surrounding villages in the south-western boundary of the Park. I was informed on 15th July and same day I rushed to Paterpani on elephant back from Kalagarh to guide the operation from there. Mr. G.S. Yadav, Wildlife Warden (Western region), a police force and some more staff moved to Kalagarh on the same day. Enquiries revealed that one notorious poocher Jagga from Kalluwala village near Kalagarh who had a criminal history and was known to poach animals and illegally cut trees from the Park and surrounding areas was missing from his house. So the then Range Officer Kalagarh Mr. Ramesh Chandra Nautiyal with the assistance of his staff, kept a 24 hour secret vigil on his house with binoculars from a tree top. On 17th July late in the evening a stranger was seen coming to Jagga's house from the direction of the Reserve. The staff waited for the night and raided the house and caught the stranger who was sleeping in the house. Immediately, he was forced to lead a large force of forest staff under the command of Mr. Yadav to look for the poachers. Soon they came upon the gang of seven poachers, camping by the side of a nullah about 3 km from Paterpani. There was exchange of fire and the gang, with Jagga as their leader was over-powered. Two fresh leopard skins and 8 locally-made jaw traps were recovered from them apart from the locally-made firearms and other materials. The poachers had been camping there for about a week and had killed the leopards with the help of

the traps. The raiding party, after having trekked nearly 30 km that day in heavy rain across gushing nullahs and slippery hillsides, and through tall thick grasses brought the poachers to Kalagarh by night. Interrogation revealed that Jagga had been regularly selling animal skins to some people in Delhi whose names he did not reveal, inspite of tough interrogation. They were sent to jail and a criminal case was institute against them. However, they managed to get away with only one year's imprisonment. It was an eye-opener for us as we were under the impression that the core is safe from poaching. Thereafter we tightened our security of the core area and southern boundary, and took several other measures to check the recurrence of such incidents.

MORALE BOOSTING OF STAFF – AN EXAMPLE:

On 3rd August, 1990, Mr. Babu Lal, Range Officer (Tourism Range, Dhikala), along with two of his staff, and the shop-keeper of Dhikala, Mr. Budhi Ballabh Kala was going to his headquarters by departmental boat via Kalagarh main dam with the monthly salary of his Range Staff. He saw some people fishing in the dam waters with the help of a live electric wire. While they were interrogating the culprits who turned out to be employees of the Irrigation Department (ID) at Kalagarh, some more ID employees led by a Junior Engineer, intervened and started man-handling the forest staff. They illegally detained the Range Officer and others and took them by a vehicle to Kalagarh and handed them over to the Police lodging a false report that they were trying to enter the tunnel of the dam. The Range Officer tried to explain his position to the Station officer but the Police Station was surrounded by the ID employees who pressurized the police to lodge a report and put them in police lock-up. Even the higher officials of the ID did not intervene. The forest road being closed because of rains the special messenger could reach my residence at Ramnagar by a motor cycle via Kashipur only at 2 a.m. I reached Kalagarh early that morning, along with the Deputy Director and other officers and staff of the Park. The Range Officer and others were in police lock-up; the Station Officer was at his residence and could only be contacted at 6.30 a.m. I explained the happenings to him and refused to leave the place even to eat anything, until the illegally detained staff was freed. The Superintendent of Police, Bijnor, and the Circle Officer, Dhampur, under whose jurisdiction the Police Station fell, were not available to intervene in the matter. By then I had called my field staff to the :Police Station fearing reprisal by ID employees. Seeing our disciplined staff in uniform and with the solid support of their officers, the ID employees who were surrounding the Police Station in a very indisciplined manner, could not sustain their false claims any longer. The Circle Officer reached Kalagarh police Station at about 4 p.m. and ordered the release of our staff, easing the situation. My officers, staff and I had the first tea of the day at 5 p.m. after our Range Officer and others had been released. A case was instituted against the Junior Engineer and other offenders which was still pending in the Courts when I left the Reserve. Our action acted as a great morale booster, not only for the Tiger Project Staff, but for all the forest staff of the nearby Forest Divisions. The ID staff and officers must also have learnt a lesson.

DEALING WITH HI-FI POACHERS:

I had definite reports about a helicopter occasionally landing deep inside the Sonanadi Sanctuary, where the approach on ground was difficult. This was in 1990 when Sionanadi Sanctuary was not under the direct control of the Field Director (FD) but under the Wildlife Warden Kotdwar, who had some skeleton staff to patrol the area. I wrote a demi-official letter to the Secretary of Forests Uttar Pradesh and also to the District Magistrate Pauri, regarding two instances of the helicopters landing in the Sanctuary, which had come to my notice. These had to be reported to Government and District Administration as only they could deal with Civil Aviation Authorities to check such an illegal activity. No action could be taken until December 1992 when a helicopter of the India International

Airways (IIA) with one leading industrialist of Delhi, two Germans and a pilot fell into the Kalagarh Dam deep inside the Sonanadi Sanctuary. I was wrongly informed by the Nainital Police that a Government helicopter, which took off from Kotdwar for Corbett Park, had been missing. The same day, a helicopter of a private company from Delhi made two landings at Dhikala and Khinanauli under Corbett National Park without permission and quickly flew off after the persons in the helicopter made some quick enquiry with the staff. Later, the same helicopter found the passengers and pilot of the missing helicopter drowned near Compartment 4 of Shisham Khatta by the side of the lake and subsequently rescued them. The Bijnor Police later misinformed me on wireless that the missing helicopter had returned safely. However, I instructed the Sonanadi Range staff to make an enquiry and also reach the bank of the lake in Sonnandi Sanctuary by boats. But since the helicopter was deep in the lake waters, nothing could be found. On 4th January, 1993, IIA wrote to the Range Officer, Sonanadi about the crash of their helicopter in the Ramganga Dam and sought his help in approaching the crash site. The Range Officer, along with employees of IIA found the crashed helicopter at the periphery of the lake in Sesham Khatts compartment 4 on side of the lake. An offence report was issued by him the same day for illegal entry into the Sanctuary. Enquiries revealed that the industrialist had taken his German guests for hunting deep into the Sonanadi Sanctuary and they wanted to land on a patch of grassland by the side of the lake, but the helicopter slid down the steep side of the lake and crashed into the water. The passengers swam to the shore with the help of life jackets. A Gujjar who was lopping a tree on a hillside nearby had seen the crash and also saw fire-arms with the passengers when they reached the shore safely. The ID, which releases Dam water for power generation on or after 15th of November every year, released water much earlier, and in greater quantities, to help the offenders rescue the damaged helicopter and claim insurance money. Since the staff were vigilant, on 25th of January 1993, they could seize the helicopter and two boats at the Main Dam, while they were being surreptitiously removed to Delhi on two trucks. The security staff of the Dam and the ID authorities were conniving with the poachers. However, the highly connected offenders used all their influence to release the helicopter and the culprits went scot-free. They also managed to implicate some senior officers of the department to face contempt of Court. However, the case got national coverage, exposing the highly connected habitual poachers. The recurrence of hi-fi poaching by helicopters did get serious setback for a long time.

In another incident some guns were seized from a big poaching party which had entered Kaldhunga area of the Sarda Range of Haldwani Forest Division. The gang was caught by the Wildlife Warden (Western region) and forced to pay a compensation of Rs. 100,000. In another case, poachers of a sambar in Haldwani Forest Division, were made to pay Rs. 150,000 in compensation. One State Guest was caught by me and the Deputy Director of the Reserve. Mr. Rajev Bhartari, while illegally fishing in the Tiger Reserve. He had to pay a compensation of Rs. 25,000.

EVICTON OF ENCROACHMENTS:

Part of the forest land of Corbett National Park at Kalagarh was given to Irrigation Department in the early sixties with the understanding that when the construction of the dam was finished, and extra staff and labour force disengaged, the buildings and the land would be reverted back to the National Park. Instead, over the period, the land was encroached by various people, which caused a lot of damage to the Reserve. Several efforts were made to get the land and houses vacated but they did not succeed. Finally I contacted Mr. Kaushik, Commissioner, Moradabad who arranged a meeting of the ID, concerned District Administration and the Park Management, before giving orders for the eviction of encroachments. On 19th June 1993, I organized encroachment eviction drive with the help of district administration and finally evicted about 100 encroached houses. As the houses were uninhabitable and old, they were demolished along with one cinema hall. Ten families of nomadic

Kanjars, who kill reptiles and small mammals, were camping on the Reserve land illegally for several years. They were shifted to Dhampur, far away from the Reserve. Illegal cultivations were also evicted. Over 100 hectares of land so evicted was planted and now there is an excellent mixed plantation coming up on this land. I only hope that the efforts would continue and the remaining land is also returned to the Park and the growing damage due to the swelling population of Kalagarh township would be minimized.

GIVING USEFUL EMPLOYMENT TO LOCAL YOUTH:

The Reserve has been attracting tourists from all over the world but the tourist inflow suddenly increased in the late eighties reaching a figure of forty thousand visitors per season. The tourists came straight to the park and stayed in Government accommodation leaving hardly any benefit to locals. This caused great resentment among the local people and the Park Management was not able to get the desired support from them. I realised this during my visits to villages in the buffer area. I thought that one of the ways to involve local people would be to train the youth in nature-interpretation so that they could act as nature guides to tourists. A course of nature guide training for 25 local youths was organised for a period of ten weeks from 1st October 1993 and was financially supported by the Government of India. This was the first ever course of its kind in any Tiger Reserve in the country. The youths so trained were registered by the Park Management as nature guides to accompany the visitors. This was very useful for the visitors also as they could get proper guidance and information from them. Since then two more batches of nature guides have been trained.

EMPHASIS ON RESEARCH AND TRAINING:

The first ever research workshop was held at Kalagarh in May 1994 jointly with Wildlife Institute of India Dehradun. A bird-watching camp was held at Lohachaur in the same year and some nature camps for school children were conducted. Mr. Rajeev Bhartari took keen interest in these activities, and since then these activities are being conducted as annual features.

These are the highlights of my attempt at the betterment of this beautiful Reserve dear to so many people around the globe. I wish to continue my efforts within my own limitations even after being no longer directly involved with the affairs of the Reserve and hope that my efforts will find support from the dedicated Reserve Management. I have already started this through a programme called 'Operation Eye of the Tiger,' which has initiated its conservation programme in and around Corbett Tiger Reserve. It is the need of the day to strengthen conservation in biodiversity-rich areas like Corbett, which are threatened by the ever-increasing human needs.

THE HIGHEST TIGER DENSITY IN CTR

The all Indian estimation of Tiger, copredators and their prey conducted by MoEF Govt. of India with technical support of Wildlife Institute of India and in collaboration of State Forest Department in 2005 & subsequent exercise of camera trapping in all high density tiger areas of the country has revealed that the highest Tiger density anywhere in its range in Asia was found in Corbett Tiger Reserve. In some parts of the core area the density is as high as 25-30 tigers per 100 Sq. Km.. The presence of 4 villages deep in the TR was detrimental to growth of tiger population. By relocating these villages and returning prime land (about 400 hectares) to the TR the southern part of the TR could come at par with the Patlidoon valley (Dhikala Chaur & Surrounding area) as far as tiger population is concerned.

Building An Arc

Despite poachers, insurgents and political upheaval, India and Nepal's bold approach to saving wildlife in the Terai Arc just may succeed.

***John Seidensticker and Susan Lumpkin**

It was nearly when A.J.T. Johnsingh set off at his usual forced-march pace down a dusty path hugging the eastern bank of the Ganges River in Rajaji National Park. Johnsingh, one of India's foremost conservation biologists, was looking for tiger tracks, though he hadn't seen any here in years. Every few yards, he trotted off the path and onto the sandy riverbank, calling out the names of birds and plants he spotted along the way. Suddenly he stopped and pointed at a paw print—a tigress. Any other tracks she left had been obliterated by human footprints, bicycle treads and the mingled track of cattle, goats, deer, pigs and elephants. But we were thrilled: somewhere, not far away, a tiger was stirring.

India's Rajaji National Park, which lies 140 miles northeast of New Delhi, is bisected by the slow-moving Ganges just south of where the river tumbles out of the Himalayas. In the past, tigers, elephants and other animals had little trouble crossing the river in this region, but now roads, train tracks, irrigation canals, a multitude of temples and ashrams and a military ammunition depot pose a formidable barrier, creating two separate park areas. The riverside forest Johnsingh led us through is the last mile and a half of corridor between the two parts of Rajaji National Park. Johnsingh had struggled for years to keep this crucial forest link intact so that populations of animals don't get stranded on one side or the other.

Johnsingh, a wildlife biologist with the World Wildlife Fund's India branch and the Nature Conservation Foundation, was excited by the prospect that the tigress might venture across the river and mate with tigers in the western half of Rajaji, giving the isolated, declining tiger population there a much-needed boost of fresh genes. "For more than 20 years I've seen the habitat get mostly worse in Rajaji", Johnsingh said. "This tiger's track on the riverbank tells me we might be turning the corner and that maybe we can restore and maintain tigers in this park, and beyond."

The effort to preserve this habitat spanning the Ganges is but a small part of a grand conservation experiment being conducted at the base of the Himalayas in northern India and western Nepal, along a green ribbon of forest and tall grassland called the Terai (Sanskrit for "Lowland") Arc. One of the world's most diverse landscapes, it is also one of the most imperiled. Between Rajaji and Parsa Wildlife Reserve, about 620 miles to the east in Nepal, lie several protected areas that conservationists hope to string together as a stronghold for tigers, leopards, Asian elephants and other endangered species.

The need for such an approach is acute, and growing. Today, India's economic boom threatens to obliterate the 11 percent of the nation that still shelters large mammals. There is a huge demand for wood and stone for construction. New roads, including one called the Golden Quadrilateral, a multilane highway that links India's major cities, gobble up and fragment wildlife habitat. At the same time, many Indians remain desperately poor. Some people poach wild animals to put food on their tables, and they collect wood from protected forests for cooking. Illegal wildlife traders also hire the poor to poach tigers and other animals, paying them money they cannot match at other jobs. The skin and bones of a tiger fetch traders thousands of dollars on the black market.

In Nepal, the problems have been even worse. A deadly conflict has raged for more than a decade between the government and a homegrown Maoist insurgency. In February 2005, King Gyanendra assumed absolute control of the government. Massive pro-democracy demonstrations in

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Katmandu and other cities, in which 17 protesters were killed and many more injured, forced him to restore Parliament in April of this year. The Moists have agreed to peace talks, but whether they will now join the political process or return to armed conflict was an open question.

Intense fighting in the past five years has put Nepal's tigers, rhinos and elephants at greater risk, because it has diverted law enforcement's attention away from the illegal killing of wild animals, which appears to be on the rise. The hostilities have also scared away tourists—one of the nation's largest sources of foreign exchange. Tourism gives value to wildlife and helps ensure its survival. In a sense, the protected areas of the Terai Arc frame a big idea—that tigers, elephants, rhinos and human beings can live together along the base of the Himalayas, one of the most beautiful places on earth. The notion of creating vast international conservation areas by linking smaller ones isn't new: some conservationists have proposed connecting Yellowstone to the Yukon, for instance—but nowhere has the approach gone as far as it has in the Terai arc. This past fall, we traveled the length of the region on behalf of the Smithsonian's National Zoological Park and the conservation organization Save the Tiger Fund. On previous visits we'd seen signs of flourishing wildlife. But given a recent plague of poaching in India and the hostilities in Nepal, we wondered how much would be left.

The brothers A.S. and N.S. Negi are separated by 18 years of age but are united in their passion for conservation. N.S., now 81, served for many years as a forest ranger in Corbett National Park, 20 miles to the east of Rajaji; A.S. Negi was Corbett's director in the early 1990s. Now both retired, the brothers and Johnsingh formed a small organization called Operation Eye of the Tiger in 1996 to protect tigers and preserve their beloved park, named for Jin Corbett, the British hunter who killed numerous man-eating tigers in northern India in the first half of the 20th century. We met up with the Negi brothers in the bucolic Mandal Valley that forms the northern boundary of the park.

Eye of the Tiger has helped 1,200 families in the area buy liquid petroleum gas connectors, which allows them to cook with gas instead of wood. This has helped reduce the amount of firewood burned by each family by up to 6,600 to 8,800 pounds per year. Not only does this save the forest for wildlife, it also saves women and girls from the arduous task of collecting firewood and the danger of encountering a tiger or elephant. Unfortunately, A.S. Negi says, the price of bottled gas, once low, is rising in energy-hungry India and may soon be out of reach of most villagers. Through additional subsidies, the Negi told us, they persuaded some villagers to replace their free-ranging scrub cattle, which graze in wildlife habitat, with animals that yield more milk and are not allowed to roam. But we wondered what such small steps might have to do with tiger conservation.

The next morning we found out. We drove to the border of the tiger reserve and hiked in, and soon we spotted the tracks of a tiger that had followed the very trail we were on for about 100 yards before it padded overland to the river below. This tiger would make an easy mark for a poacher, but it was quite fearlessly there, sharing this valley with the villagers. Before the Negis began their work, poaching was rampant in this area. It seems their attention to the villagers had indeed made a difference, and we think the lesson is clear: if tigers are to survive in this landscape, it will happen one village at a time.

Most of the forest between Corbett and the Royal Shuklaphanta Wildlife Reserve in Nepal is managed to produce timber, with its teak and eucalyptus trees planted in straight lines. But the area is also rich in the big rocks favoured for construction materials. Johnsingh pointed to men hauling boulders in a dry riverbed. From there the boulders were pitched onto trucks and driven to railway heads, where workers crushed them with sledgehammers. This backbreaking work is done by the very poor, who camp in squalor where they toil and survive by gathering firewood and poaching in the surrounding forests. Boulder mining was banned in some Indian parks, whereupon the miners promptly moved their operations outside the protected areas. Johnsingh believes that a better solution would

be to permit boulder mining along developed stretches of riverbed and prohibit it where wildlife needs passageways.

Emerging from the forest about 20 miles from the Nepal border, we inched in our four-wheel-drive vehicle along a two-lane highway crowded with pedestrains and an impossible assortment of cattle carts, bicycles and motrocycles, overflowing pedicabs, taxis, cars large and small, buses, trucks and tractor-pulled trailers. This is a prosperous area, thanks to dams that provide power to villages and water for irrigated agriculture. No tiger could navigate this maze, but Johnsingh has identified a potential forest corridor to the north through which it could make its way.

Entering Nepal, Johnsingh hands us over to Mahendra Shrestha, director of the Save the Tiger Fund. We had been uneasy about going into Nepal. The conflict with the Maoists has killed some 13,000 people here since 1996, most of them in the very countryside to which we were headed. In Summer 2005, five of Shrestha's field assistants were killed when their jeep ran over a land mine likely planted by the Maoists. But in September 2005, the insurgents had begun a unilateral, four-month-long cease-fire, and our trip had been timed to coincide with it.

We spent the night in Mahendranagar, a small town at the edge of Shuklaphanta. A battalion of about 600 soldiers is stationed inside and around the park. In the 1970s, when poaching of rhinos and tigers was rampant, the Royal Nepalese Army took over security in Nepal's National parks and wildlife reserves. Since the insurgency began, the army has devoted more effort to quelling it and defending itself than to patrolling for poachers. Soldiers were moved from forest outposts to fortified bases, giving both Maoists and poachers greater freedom in the forests.

Shuklaphanta contains 40 square miles of grassland surrounded by a forest of sal trees. Some of the tallest grasses in the world, standing more than 20 feet high, thrive here. Driving along a rutted dirt road, we saw wild boar, spotted deer and even a small herd of hog deer-the rarest deer of the Terai Arc. But we had come to find out how tigers, leopards, elephants and rhinos, so attractive to poachers, were faring with the army preoccupied with the Maoists.

A glimpse of two elephants, one rhino track and one tiger track next to a water hole bolstered our spirits. In fact, the park's warden, Tika Ram Adhikari, told us that camera traps had recently documented 17 adult tigers here, for a total estimated population of 30, which means they're as dense in this area as in any place they live.

Adhikari's usual ebullience evaporated at a water hole littered with dead and dying fish. Cans of pesticide-used to stun and kill fish so they float to the surface-lay on the shore alongside fishing nets. Poachers had dropped the tools of their trade and vanished upon our arrival. At another nearby water hole, a distraught Adhikari pointed out a set of tiger tracks, normally a cause for cheer but now worrisome. What if the tiger had drunk from the poisoned pond? Even more troubling was the thought that local attitudes toward the park and its wildlife might be shifting.

From Shuklaphanta we continued east along the highway toward Royal Bardia National Park, Nepal's next protected area, stopping often at heavily fortifide checkpoints so that armed soldiers could inspect our credentials. The soldiers' behavior was entirely professional; these were not hopped-up teenagers brandishing rifles in our faces. But we stayed alert, aware that there are good and bad guys on both sides of the conflict. For example, the Nepalese Army has been accused of torture and other abuses, and Maoists have been known to invite people to step safely outside before blowing up a building.

Maoist insurgents control more than half of Royal Bardia National Park's 375 square miles. As we sipped scotch after dinner at bardia's nearly empty Tiger Tops Karnali Lodge, the evenings quiet was shattered by the sounds of shouting, clashing gongs and thumping drums-villagers trying to drive off elephants intent on eating unharvested rice. We heard the same ruckus the next two nights. With noise pretty much their only defense, the villagers are outmatched by the crop-raiding pachyderms.

Between eating it and stomping it, just a few elephants can destroy a village's rice crop in a night or two.

We caught up with the marauders the next afternoon on an elephant-back tour of the park. Our trained elephants sensed the presence of their wild relatives in a dense patch of trees, and our elephant drivers moved cautiously toward them so we could get a closer look. But with the first glimpse, the animals we were riding backed away, and we retreated hastily across a river. Three wild males—which we nicknamed the Bad Boys of Bardia—glowered at us from the other side until, with the light failing, we finally departed.

Wild elephants disappeared from Bardia many years ago, but in the early 1990s, about 40 somehow found their way back. No one is sure where they came from—perhaps as far away as Corbett National Park—and today they number between 65 and 93. Copying a model pioneered in Chitwan, conservationists in Bardia worked with local community groups to protect this forest and help them raise and market such cash crops as fruit and medicinal herbs.

In the buffer zone around Bardia, we met with members of one of these associations, the Kalpana Women's User Group. They told us that one recently completed project is a watchtower from which farmers can spot wild elephants. They also told us they have purchased biogas units so they no longer have to collect fuel wood in the forest. (Biogas units convert human and animal waste into methane, which is used to fuel stoves and lanterns). Last year, the women won a conservation award from the World Wildlife Fund program in Nepal, and they used the 50,000 Nepalese rupee prize (about \$700) to lend money to members for small enterprises such as pig and goat farms. These women, with sheer angry numbers, have also arrested timber poachers and received a share of the fines imposed on the culprits.

But success breeds problems. In the Basanta Forest between Shuklaphanta and Bardia, tigers killed four people in 2005 and 30 elephants destroyed nine houses. "We like to have the wildlife back" a member of a Basanta community group said to us. "Now what are you going to do about it?" There is no easy answer.

It's a day's drive—about 300 miles from Bardia to Nepal's Royal Chitwan National Park. Though tigers live in the forests between the two parks, bustling towns in the river canyons between them prevent the animals from moving freely from one to the other.

Our excitement at finding fresh tiger tracks on a riverbank near a Chitwan beach faded after we entered the park itself. Moving in and out of forest and grassland, we scoured the landscape looking for rhinos. In 2000, we saw so many—at least a dozen during a three-hour elephant ride—that they lost their allure. But on this morning, only five years later, we spotted just one.

Only organized poaching could explain such large losses. Poaching rhinos for their horns (which aren't really horns but compacted masses of hair used in traditional Chinese medicine—not as an aphrodisiac as is widely believed) was rampant in the 1960s. After poaching was curbed by the army beginning around 1975, rhino numbers rapidly recovered. But here, as in Bardia and Shuklaphanta, the Nepalese Army abandoned the park's interior to fight Maoists, and the poachers returned in force. Eventually, though, the loss of the park's 200 or 300 rhinos spurred warden Shiva Raj Bhatt to action. He told us that in the few months before our visit, he had arrested more than 80 poachers—all now languishing in a local jail. Under the leadership of a hard-nosed colonel, the army, too, had reportedly stepped up its anti-poaching patrols.

More encouraging still, Chuck McDougal, a longtime Smithsonian research associate and a tiger watcher for more than 30 years, informed us that a census he'd just completed found all 18 tigers in western Chitwan present and accounted for. What's more, McDougal reported, a pair of wild elephants were turning up regularly—a mixed blessing. And the first group of American tourists in more than two years had checked in at Chitwan's first tourist lodge.

In 2005, Nepal recorded 277,000 foreign visitors, down from 492,000 in 1999. Although tourists have largely escaped the attention of Maoist rebels, some visitors have been forced to pay a "tax" to armed insurgents. The possibility of getting caught in a crossfire or of being blown up by one of the mines that lurk under certain roads has kept tourists away. In Baghmara, on the northern border of Chitwan, tourist dollars offer an incentive to villages to tolerate tigers and rhinos, but with tourism at a nadir and tiger attacks on the rise, tolerance is wearing thin.

The save the Tiger Fund recently reported that tigers now live in only 7 percent of their historic ranges across Asia. At the same time, the amount of habitat occupied by tigers has fallen by 40 percent in the last ten years. After 35 years of working to promote the conservation of tigers and other large mammals, we find these statistics terribly depressing. But the Terai Arc is one of the few bright spots highlighted in the report.

Despite the obstacles-from bolder-mining to crop-raiding-our traverse of the arc largely confirmed that report's optimism and helped dispel our gloom. Here,, tiger numbers are increasing and tiger habitat is improving. Elephant numbers are also on the rise, and rhinos will surely rebound if anti-poaching efforts can be resumed. Local people are benefiting from conservation, too, although much more needs to be done-such as surrounding crops with trenches or plants unpalatable to animals and building more watchtowers-to protect them from wild animals roaming their backyards.

If the goal of a connected, international conservation landscape comes to fruition, the arc may become one of the rare places where tigers, rhinos and Asian elephants survive in the wild. How it fares will tell us whether people and wildlife can thrive together or that is just a dream.

Courtesy – Smithsonian Magazine, June 2006.

A Procedure for Tracing Representatives Tiger Pugmarks

***Vinod Rishi**

The use of a pug mark tracer - a rectangular sheet of glass, normally about 18 cm x 22.5 cm x 3 mm - in the exercise for census of tigers is well known to the forest staff. However, neither every person associated with census work is a good draftsman, nor one can expect it to be so. Consequently more often than not, the tracings that reach to the co-ordinator of the census operation for screening the tigers do not qualify as the right kind of tracings. Defective tracings create problems in screening the pugmarks for identification of tigers and arriving at the correct census figure. This factor has often been the root cause of criticism of the work done by the forest officers in counting tigers by the so called 'put-mark' technique. The criticism is valid so long as such abnormal tracings are taken into account and personal skills are pressed into service to judge the tracings and identify the tigers.

The problem of tracing non-representative tracings is not insurmountable. The following method can be employed to enable any person to pick-up truly representative tracing of the pugmarks of tigers and leopards:

For the purpose of census of tigers, the tracings of foot prints left on the ground by the left foot of tigers are considered. The current practice is to take the tracings of the left hind foot of the tiger as a standard for comparison and identification of tigers.

To recall, for taking a tracing of the pugmark the tracer is placed over the impression of the left hind foot of the tiger (or the leopard, as the case may be) such that the glass does not touch the impression. A felt tipped pen is used to trace the outlines of the pugmark on the tracer by looking at the pugmark impression vertically down through the glass so as to avoid parallax error. After the traced out form of the pugmark has dried out on the tracer glass, the tracer is picked up and a piece of tracing paper is placed on the tracer-glass plate. It is then held against the light so that outlines of pugmark drawn on the glass plate can be seen through the tracing paper. The pugmark impression is then traced out on the tracing paper. This method is familiar to most of the field staff involved in carrying out the census exercise in most of the tiger reserves.

The foot prints of the left hind foot are normally a mirror reflection of the impressions left by the right foot unless there is a physical deformity in the structure of the limb. This empirical truth becomes useful in refining the tracings of the foot prints and eliminating defects introduced because of human error. For applying the method for refinement of the tracings, it will be necessary to pick up a trail which has at least three clear imprints of left hind foot of the same tiger. The exercise then starts with taking a tracing of one of the imprints of the left hind foot of the tiger.

In order to carry out the refining of the traced pugmark the correction is to be made before the traced pugmark impression is transferred to a tracing sheet as a permanent record. That is, the work for refining the pugmark impression is to be taken up while the impression is still on the tracer-glass plate.

After tracing the pugmark of left hind foot on the glass plate, the tiger tracer is turned over such that the left foot print now looks like the print of the right foot. The inverted tracer when placed over pug mark of the right hind foot will show some amount of difference in the outline of the imprint on the ground and the traced outline on the inverted surface of the tracer glass. It helps if the top edge of outline of the inter-mediate pad - the broad palm-like pad beyond which the toes are arranged - on the ground is aligned with the corresponding part of the top edge of intermediate pad drawn on the tracer is aligned first and the rest of the boundaries of the intermediate pad are aligned thereafter. It clearly

brings out the deviations between the outlines traced on the glass sheet and the borders of the pug marks of the foot on the ground.

At this stage, the tracer-glass will be having the tracing of the left hind foot-print on its underside, which when looked at from above will appear as if it is the impression of the right hind foot. After the tracer is aligned to approximately match the actual impression of right hind-foot left by the tiger on the ground, a correction line is to be drawn approximately averaging the difference between the two boundaries of the tracing on the dorsal side on the tracer and the borders of the right pug mark on the ground. We will now have two tracings on the glass sheet, one being the outline traced from the actual impression of the left hind foot of the tiger, and the other the corrected tracing drawn by comparing its reversed image with the imprint of the right hind foot.

The tracer is then taken to the next available left hind foot print and the tracer is once again turned over to align the boundaries of the tracing with those of the intermediate pad of the second left pugmark. If needed, further refining of the boundaries of the intermediate pad may be carried out in the same manner as described above. The tiger tracer may be turned over yet again for a check with the next available pug mark of the right hind limb. Invariably two repetitions tend to refine the tracing on the glass plate sufficiently to allow finalisation of the representative tracing of the tiger pugmarks. Further cross check can be made if more foot prints belonging to the same trail are available along the forest path. The refined mark is then transferred to the tracing sheet and used as a basic pugmark for the purpose of tiger census.

The human error in draughtsmanship skill of the observer can be overcome to quite a reasonable extent by drawing at least two refined tracings from each set of a tiger trail.

Caution:

IF REFINEMENT SEEMS TO BE IMPOSSIBLE BECAUSE THERE IS A CONSTANT DIFFERENCE BETWEEN THE LEFT AND RIGHT HIND FOOT IMPRESSIONS IT CAN MEAN A CHARACTERISTIC OF THE INDIVIDUAL TIGER AND BE A VERY USEFUL IDENTIFYING FEATURE OF THAT PARTICULAR TIGER. Deviations caused by physical deformity in the tiger's paw tend to recur over and over again every time the attempt is made to reconcile the tracing with the pugmark of the other foot. The deviation refuses to get eliminated. The deformity detected must be taken note of and recorded as a special feature of the particular tiger.

For persons with excellent draftsmanship skills and good understanding of the structure of the foot and pads of the tiger it is possible to trace perfect representative pugmark by following a virtual contour line about 1-2 mm above the bottom of the intermediate pad. Yet it is advisable to use the procedure for refining the tracings as far as possible before finalising the tracings. Normally, even with a good understanding of the shape and form of tiger pugmarks, it is difficult to know exactly where on the tracer the line should be drawn to record the true form of the pugmark. For those who can visualise a contour line running all round the inside edges of the impressions left by intermediate pad and the toe-pads, 1.5 mm to 2 mm above the flat basin of the impression on the impression pad, it may be possible to draw the form more accurately to get the actual shape and size of the pugmark. It gives a better tracing for refinement by the technique described above. For training one can draw a contour line on a plaster cast of the tiger pugmark and trace it using a tiger tracer. But this is not advisable unless one has the requisite skill to do so, or if there is no trail available for refining the tracing. The procedure for refinement of tracing is not applicable to tracing of single pugmarks found at the edge of water holes or vague trails in loose sand.

Feeding behavior of some fresh water fishes of Doon Valley

*Sangeeta Rawat

Abstract :

A comparative Study of gut of 26 species of fresh water fishes has been done. Depending on the morphology and the length of gut together with its contents, the fishes were, categorized as carnivorous, omnivorous and Herbivorous. The relative length of gut have direct relation with their feeding habits. In Herbivorous fishes alimentary canal is long, highly coiled and thin walled ranges from 2.213 to 16.25mm. In carnivorous alimentary canal is short, thick walled and nearly straight, ranges from 0.4385 to 1.050 mm. In omnivorous the alimentary canal is of intermediate condition, ranges from 0.8 to 2.603 mm.

Introduction:

Dehradun Valley is situated between $30^{\circ}34'10''$ and $78^{\circ}18'30''$ E longitude and $29^{\circ}58'40''$ and $31^{\circ}24'N$ latitude. It occupies an area of about 1200 sq.km. The Valley is in the form of an irregular parallelogram, enclosed by natural boundaries viz. the Himalayan Mountains in North, the Shiwalik range in South and the river Ganga and Jamuna on the east and west respectively. The herbivorous fishes feed mainly on unicellular and filamentous alga, diatoms and macrophyts. This type of food material is mostly scrapped off from the rocks. The food of omnivorous fishes consist of variety of percentage of plant and animal material. They feed on insects, nymphs, algae and diatoms. Carnivorous fishes in their early stages feed on insect larvae and small Prawns, while the adults feed on other fishes. Important contribution on food and feeding behaviour of fishes are by Lal (1968), Grover (1975), Badola and Singh (1980), Khanna and Pant (1964), Nath (1978), Badola and Singh (1988), Chander Sekhar et. al. (1993), Srivastava et al. (2002). This paper describes food and feeding behaviour of some fresh water fishes of Doon Valley.

Material and Methods

For studying the food material length of alimentary canal, 8-10 fishes of each species were brought to laboratory and the length and weight of fish and alimentary canal is measured. The relative length of gut is calculated. The gut contents were thoroughly washed into a petridish and examined under microscope for identification of various groups of animals and plants (for micro-organism) and by naked eyes (for macro-organism). Obtained food items were identified upto order, family and generic levels. The relative abundance of a particular item of food was expressed as percentage of total number of food items in the sample. The Intensity of feeding was studied by determining the gastro-somatic Index.

$$GSI = \frac{\text{Weight of gut}}{\text{Weight of fish}} \times 100$$

Result and Discussion

Crossocheilus latius latius, *Garra gotyla*, *Labeo dero*, *Schizothorx richardsoni*, *Schizothorachthys progastus* are grouped as herbivorous fishes. The alimentary canal is long and convoluted or highly coiled and thin walled. The relative length of gut in the fishes ranges from 2.213 to 16.25 mm. Alimentary canal contains unicellular and filamentous algal diatoms and macrophyts.

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The aquatic flora obtained from the alimentary canal of these fishes are Tabellaria, Synedra, Navicula, Amphora, Chlorella, Chlamydomonas, Cladophora, Chara, Hydrodictyon, Ulothrix, Zygnema, The present study agrees with the findings of Nath (1978), Subla and Das (1970), Grover (1975).

Noemocheilus botia, Noemocheilus montanus, Noemocheilus rupicola, Glyptothorax cavia, Glyptothorax pectinopterus, Pseudochenesis sulcatus, Matacembelus armatus, Mastacembelus punctatus, Xenentodon cancilla, are categorized as carnivorous fishes.

The aquatic flora obtained from the alimentary canal mainly consists of nymphs of Placoptera like Peria Sp., Prilidae, Chloropertidae, Larvae of trichoptera like glossasoma sp., Leptocealla sp., Notanatolica, sp., Rhyacophila sp., Melanotrichia sp., adult of Hemiptera like Gerridae, Halobates sp., Nepa sp., larvae of Diptera like Leptidae, Simulium sp., etc. small amount of Garphonema, Synedra, Chlamydomonas, Spirogyra is found. The alimentary Canal is short thick walled and nearly straight. The relative length of gut of these fishes ranges from 0.4385 to 1.050mm. The length of gut is generally less than the body length. Barilius benedekesi, Barilius vagra, Tor putitora, Tor tor, Barilius bola, Barilius barna, Puntius Chola, Puntius sarama, Puntius sophore, Lepidocephaliichthys gunetea are categorized as omnivorous fishes. The relative length of gut of these fishes ranges from 0.8 to 2.603 mm. The alimentary Canal contains both aquatic flora and fauna in almost equal amount. It contains plants from bacillariothyceae, Chlorophyceae, Myxophyceae, nymphs of Plecopter, Larvae of trichoptera, diptera, and adults of hemiptera and coleoptera. The present observation on the food and feeding habits of these species revealed that they are omnivorous. These observations are similar to findings of Badola and Singh (1980), Khanna and Pant (1964).

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Study on Breeding period and behaviour of Garra gotyla gotyla and Crossochelius latius latius, of family cyprinidae.

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Abstract:

Both are fresh water fishes belonging to family cyprinidae and both are monsoon breeder. They migrate upstream in shoals in search of shallow spawning grounds. They breed once during a year and their spawning season is very short during the early part of rainy season. The breeding period of Crossochelius latius latius is from July to September. The breeding season of Garra gotyla gotyla is from July to September.

Introduction:

Crossochelius latius latius and Garra gotyla gotyla are found in Song river, Tons river and Suswa river of Doon Valley. It is brownish olive-superiorly and light coloured on sides. Body is irregularly marked with a number of dark spots. Abdomen is silvery white. Garra gotyla gotyla, is found in Song river at Raiwala, Lacchiwala, Goolarghati and Suswa river at Mothronwala.

Mainly fishes are monsoon breeder (from mid June to October). As breeding season approaches these fishes migrate up stream in search of shallow spawning grounds. During monsoon physical and chemical factor such as rainfall, water temperature, atmospheric temperature and Ph of water favours the spawning. Important contribution on the breeding period and behavior of fishes is by Grover (1971), Sehgal (1961) Bhatnagar (1964), Hora (1936), Bisht and Joshi (1975), Grover et al. (1994), Uniyal et.al. (2002), Hora and Mukherjee (1936). This paper describes breeding behavior of Garra gotyla gotyla and Crossochelius latius latius.

Material and Method:

During the breeding period of fishes the mature fishes were collected from different sites. The maturity stages of females were determined on the basis of colour, shape, size and microscopic structure of ovary. Ripe specimens were used for the study of fecundity of fish. The number of mature ova which are ready to be released and with considerable amount of yolk deposition were taken for estimating fecundity. For each specimen used, the weight of preserved ovaries was noted. A portion of ovary was then weighed separately and all mature ova contained in the latter were counted from which total no of ova in the pair of ovaries was counted. Nearly ripe or ripe ovaries were taken during the breeding months. The fishes brought to the laboratory were measured and weighed. It was then dissected to remove the ovary. The entire ovary was preserved in 5% formaline, to permit hardening of ova which facilitates handling and study.

Result and Discussion:

Crossochelius latius latius is a monsoon breeder. Fish breeds in marginal shallow water from July to September. Ripe specimens were observed in May and June. The fish migrates up-stream in search of shallow spawning grounds in the main river tributaries. High percentage of mature fish occurs during June, July and August and then there is a general decrease in their number there after. Thus the occurrence of mature fishes in this period indicates that the species has a definite spawning season during October. During the winter months the fish carries maturing oocytes in a quiescent

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phase and active growth in the gonads does not continue during this period. With the onset of favorable climatic season the vitellogenesis starts again and ova grows in size and matures. From March onwards the temperature of water rises rapidly and final stages of maturation occur during the season. In August when the water temperature is favorable, the fish is fully mature to spawn and ovaries show the rest active phase of seasonal activity.

The final phase of maturation is also related to increase of day light. The water temperature and day light declines rapidly after October onwards and from November to end of December, a gradual change in the ovaries to stage II takes place. Diameter of ova -1.8 – 2.0 mm. Fecundity 2060-3200 (in 125-251 mm total length).

Garra gotyla gotyla, is a monsoon breeder, the breeding season of this fish begins from July to September being at peak in August. The fish migrates up-stream in shoals in search of shallow stony bed where the female lays eggs. Due to monsoon rains, the shallow spawning suitable grounds to lay eggs is destroyed by violent force of current. The ripe fishes are found during June and July, it indicates that this is spawning seasons of fish. Each fish does not spawn more than once in season. Diameter of ova: 1.9-2.3 mm.

Fecundity : 2612-4675 (in 165-212 mm total length).

The present study agrees with Bhatnagar (1964), that both species breed once during a year and their spawning season is very short during the early part of rainy season from July to September. It also agrees with Malhotra and Jyoti (1974), Singh and Das (1969), Malhotra (1974).

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VAN PANCHAYATS

A Community Level conservation initiative in Uttarakhand

*A.S. Negi

1. Brief Geographical Information about Uttarakhand:-

Uttarakhand is a new State created from the State of Uttar Pradesh on 9th Nov. 2000. It is situated in mid Himalayas with rich forest cover. The source of Holi Ganga & Yamuna rivers is in Uttarakhand. The salient features of the State are as under:

Total area of State – 53485 Sq.km.

Forest Area – 34662 Sq. Km.

Forest cover – 44% (approx)

Medium to dense Forest cover – approx 29%

Civil Soyam Forests – 6355 Sq. Km.

Van Panchayats – 5450 sq. km. (Civil Soyam and Reserve Forests)

Agriculture – 14.6%

Irrigation – 13%

Unirrigated – 87%

Population – 8479562

2. Special features of Hills of Uttarakhand

There are 13 districts in this state out of which 9 are totally hilly, two namely Haridwar & Udham Singh Nagar in plain area and Dehradun is partly hilly and partly in raised Doon valley. The elevation above sea level varies from 300 m to about 7800 M. The varying altitudes give rise to vast variation in its floral & faunal forms resulting in very rich bio-diversity. The State has Trans Himalayan, Himalayan and Indo Gangetic plains as its biogeographical zones. Jaunsar Bhabar in Dehradun district is a tribal area. The forests comprise of Reserved Forest (RF) under the control of State Forest Department, Civil & Soyam Forests (C.S.) under the control of district administration and panchayati Forests or Van Panchayats carved from CS & RF under community control. Dependence of local people specially in 9 hill districts and Jaunsar & Bhabar area of Dehradun district, on forest for their fuel wood and fodder needs and also for timber for house construction, construction of cowsheds and making of agricultural implements is near total. The forests also sustain the water springs vital for the drinking water supply of the rural and urban people. Some of the notable features of these hills are:

1. High percentage of forest area interspersed with agriculture and habitations.
2. Water availability depend on forest cover
3. Forests provide irrigation and power to vast population of Indo-Gangetic plains of the country
4. Forests influence global climate
5. High dependence on forests for fuel and fodder
6. Availability of fuel and fodder in market nil except for large cities and towns.
7. Rights and concession from forests available to people living in vicinity of forests.
8. Economy is women driven. Most able bodied males in services outside state.
9. Due to cold climatic conditions regeneration and reforestation on elevations above 3000 ft. very slow and degradation due to biotic pressure very fast.

10. Existence of rain shadow zones, fragile ecosystems, high rainfall during rainy season resulting in cloud bursts and high erosion.
11. Land holding scattered and small which compels traditional subsistence farming. Mostly rainfed farming and high erodibility of terrace fields.

3. Community efforts in Forest Management at National level:

Prior to British rule the forests were by and large owned by the Kings and Jamindars under whose possession they were. Even if there was any effort by communities it was only at the mercy of the ruler. During British rule large chunks of forests were reserved under Indian Forest Act 1864 & 1927. In many areas forests in the vicinity of villagers were left unreserved for meeting the day to day needs of the local communities but there was hardly any management by the communities except regulation and distribution of the produce. During reservation process wherever the rights of villagers were curtailed or stopped in the adjoining forest, it was met with dissatisfaction from villagers.

The first National Forest Policy was declared in 1894 in which very high priority was accorded to community benefits. This was revised in 1952 according to which the village communities in the vicinity of forests could naturally derive greater benefits from them for their domestic and agricultural needs but claim of communities at the cost of National interest were not to be permitted. There was yet another revision of the NFP in 1988 which marks a major departure from the earlier policy which was primarily production oriented. It lays emphasis on meeting the social needs in particular of tribal population and has laid stress on creating a massive people's movement with involvement of women, for achieving various activities and to minimize pressure on existing forests.

The forest were brought in concurrent List in 1976 and the historical Forest Conservation Act was promulgated in 1980 which is mainly responsible for saving the Forest Land which was being diverted for non forestry purposes by various State Governments. Another important Government of India's Resolution of June 1990 was passed on Joint Forest Management which stressed active involvement of people. This Resolution prompted many states to issue JFM orders, though this was also a fallout of externally aided forestry projects which advocated JFM as main component of funding. West Bengal, MP and Rajasthan had some good success stories of JFM. UP also implemented JFM, of which Uttarakhand was a part at that time.

4. Community Conservation in Uttarakhand – The Van Panchayat Scenario:

Prior to British rule (1815) the forests were identified with the villages and the people had unlimited access to forests. In the later part of 19th century and early part of 20th century the British rulers declared the forest land as Reserved and Protected forests and put restrictions to the rights of the local people. This led to great agitation by local people and they even set fire to large parts of the forests. As a result of the public agitation some reserved forest was converted to protected forest and in some forests close to the habitation Van Panchayats were constituted which were managed by the communities. Uttarakhand has the oldest history of community conservation in the country. Forest Panchayats popularly known as Van Panchayats were formed in Kumaon & Garhwal as far back as 1930 even before independence. As many as 9 Van Panchayats were formed in Kumaon and 8 in Garhwal in 1930. After formation of separate Uttarakhand State there was a concerted effort to form Van Panchayats in more villages and the number of VPs went up by utmost 100% after formation of new state.

The present Status of Van Panchayats in Uttarakhand is as under:

- (a) At present the number of Van Panchayats in all the hill districts of Uttarakhand is 12089 (5811 in Kumaon & 6278 in Garhwal) with a total area of 5450 sq.km. under them.
- (b) Maximum number of VPs is in Pauri (20%) followed by Almora (18%) and Pithoragarh (14%). Dehradun, Nainital, Champawat, Rudraprayag and Uttarkashi has only 2%, 4%, 5%, 5% and 5% VPs respectively. Tehri, Chamoli and Bageshwar have 11%, 9% and 7% VPs respectively.
- (c) In terms of area of VPs 28% are between 0-5 ha, 31% between 6-15 ha, 26% between 16-50 ha and 15% above 51 ha.
- (d) There are some VPs with large area such as Makku (Rudraprayag) 2030 ha., Gaurikund (Rudraprayag) 2006 ha., Ushada (Rudraprayag) 1001 ha, Lankhi (Chamoli) 1249 ha, Kundi (Chamoli) 1024 ha., Ratgaon chak (Chamoli) 3434 ha., Urgam, (Chamoli) 2944 ha., Bhyundar (Chamoli) 22960 ha., Mana (Chamoli) 68719 ha., Tolma (Chamoli) 18663.5 ha., Lata (Chamoli) 1071 ha., Malari (Chamoli) 8334 ha., Lwad, (Nainital) 1024 ha, Bahandargaon (Pithoragarh) 16204 ha., Rankot (Pithoragarh) 7460 ha. Saurag (Bageshwar) 3674 ha., Khati (Bageshwar) 1784 ha., Mazkot (Bageshwar) 1452 ha., Dyuri (Champawat) 5240 ha, Bagedi (Champawat) 2484 ha. Most of these are situated on higher elevation and many have high altitude grazing lands (Bugyals) included in them.
- (e) Over 800 VPs are less than 2 ha. out of which over 300 are less than 1 ha.
- (f) Out of 12089 VPs only about 25 % VPs have some money in their A/C rest do not have any amount in their A/Cs which indicates that only about 25 – 30 % VPs are active.

5. Local Efforts in Community Conservation: (Some examples)

Some of the glaring examples of community conservation efforts at local level in the state of Uttarakhand are being briefly listed here. Some of them like Chipko movement assumed international significance and some people like Gaura Devi, Chandi Prasad Bhatt and Sunderlal Bharguna shot to international fame.

1. Chipko movement started by Gaura Devi and other women of village Reni in Chamoli district in seventies. As a result of this movement a total ban on green felling above 1000 M elevation was imposed by Govt. of UP in early 80s which is being followed even now.
2. Women folk of village Makkumath in Rudraprayag district participated in management of VP and raised 600 hac. of plantation for improving density of VP by planting Oak, Rhododendron, Alder, Surai etc in late eighties.
3. In village Koti of district Chamoli community land was distributed among villagers for planting and protection and usage of produced Fodder grasses. Fodder trees like Bhimal, Kharik and Kachnar were raised successfully and villagers became self sufficient in their fodder demand.
4. In village Dakyat of Uttarkashi district the badly degraded village forest was protected by common efforts by stopping grazing and guarding the land. This resulted in regeneration of good forest capable of meeting out most of their daily demands.
5. In village Bachhed in Chamoli district the women from 200 households of the village took up responsibility of Management and maintenance of Van panchayat. This was possible after a village woman Mrs Kala Devi organised the village women and elected woman Sapranth of VP.
6. At individual level Sri Vishweshwar Dutt Saklani of village Saklana of Tehri district has planted and protected large number of Oak, Rhododendron, Deodar and other trees

in his village common land and adjoining Forest area for over 30 years. It is now dense forest capable of meeting demands of fuel and fodder of the village if properly managed.

7. Sri Jagat Singh "Jangli" of village Kot Talla in chamoli district has raised a model miscellaneous forest in VP land and has been able to protect it for last 25 – 30 years.
8. In early 1980 the women of village Dungari – Lantoli of district Chamoli agitated against felling of a Oak forest near their village and opposed the men folk of the village who were cooperating with the department and contractor. They successfully stopped the felling.
9. Women of village Khirakot of Almora district guided by a voluntary organization "Mahila Mandal" with cooperation of male members of the village protested actively for cancellation of a private mining lease for extraction of Gypsum. Ultimately the lease was cancelled and the 80 ha. VP is in good condition due to engagement of a chowkidar by villagers.
10. In District Tehri where Van Panchayats were formed very late due to the land being under Princely State of Tehri, in large number of villages the forest near the village was protected by villagers by putting a chowkidar on contributory basis. The movement was initiated by Women. In many villages Sri Sunder Lal Bahuguna also contributed out of his award money for chowkidar's wages, provided similar amount was also collected by the villagers.

6. Legal Provisions –

The legal provisions in IFA 1927, UP Panchayat Raj Act 1947 and Van Panchayat Rules made there under are listed below:

- (x.) In the Indian Forest Act 1927, Van Panchayats have been recognized as "village forests" and UP Van Panchayat Rules 1976 made under the Principal Act provide them legal protection.
- (y.) Van Panchayat Management Committee is a institution of Panchayati Raj which is constituted under article 29(6) of U.P. Panchayati Raj Act 1947 in which the village Panchayat has power to constitute Sub committee for carrying out its duties.
- (z.) Uttarakhand Van Panchayat Rules 2005 were notified on 23-1-2006 superceding Uttaranchal Van Panchayat Rules 2001 and Uttaranchal Village Forest Joint Forest Management Rules 2001. Van Panchayat or Panchayati Van (Village Forest) Management committee constituted under these rules will include Van Panchayats constituted under Van Panchayat Rules 1931, 1976 and 2001.

The Van Panchayat Rules 2005 have following important provisions which strengthen the Van Panchayats:

- Constitution of Van Panchayat
- Usufruct rights and duties of user
- Constitution of Management committee
- Preparation of Management Plan by concerned Divisional Forest officer
- Preparation of a Micro plan
- Utilization of Forest produce
- Duties and rights of Management committee
- Duties of VP Sarpanch
- Maintenance of Income and Expenditure A/Cs
- Management of village Forest Funds
- Maintenance, distribution and utilization of net profit from Forest Produce.

- Budgeting, Accounting and Auditing
- Inspection of working of Management committee.
- Constitution of Regional, District level and State level Advisory Committee.

7. **Some Important lessons for Policy Making on community Conservation in Uttarakhand**

Some Important points which will help in Policy Making on community conservation are being listed below:

- (1) In Uttarakhand no JFM experiments other than the Van Panchayats should be attempted. The JFM areas taken over during World Bank aided project prior to formation of Uttarakhand have ceased to exist after the project phase was over. I had the opportunity to monitor some 12 such areas in Kumaon and Garhwal taken up for study by FRI and it was found that even the revolving fund created during project had been misappropriated and no accountability could be fixed.
- (2) Van Panchayats with areas less than 2 hac. cannot serve the purpose of supplying usufructs to the villagers except for fodder grasses and intensive cultivation of medicinal and aromatic plants. These areas can be conserved as Bio diversity rich community conservation areas with the encouragement of State Govt. These areas can help in Water conservation and carbon sequestration apart from conservation of floral and avi faunal diversity.
- (3) There are some VPs with very large areas which are not within the management capability of Van Panchayat committees. These are mostly on higher altitudes where natural production of medicinal plants have great potential. At present they are badly managed. The Management Plan of these VPs needs to be immediately drawn up by FD and some Local NGOs or Research Organizations can be entrusted with implementation of the MP in agreement with the MC of VP. Part of it can also be made conservation Reserve under WLP Act 1972.
- (4) According to Uttarakhand Van Panchayat Directory 2007 only about 25% Van Panchayats have some kind of fund in their account though many have less than 500/- as VP fund. It either indicates scarcity of fund in majority of VPs or absence of any kind of management practice in them. Now that there is a PCCF Level officer in FD to look after VPs exclusively, it would be necessary to scrutinize all VPs closely, prepare their MP and arrange initial funding to make them viable. The Watershed Management Directorate under various externally aided projects has been carrying out afforestation and soil conservation activities in villages. These activities even when carried out in RF could be entrusted to nearest VPs with proper agreement so that VPs could be strengthened. Other activities in the nearby forest such as plantation, rejuvenation and augmentation of natural water sources, fire protection, soil conservation works etc. could also be done by FD through VPs.
- (5) Van Panchayat could be a great source of funding under carbon credit scheme. There is a positive talk of compensation of forest rich states by G.O.I A comprehensive project of Van Panchayat development and management could be prepared which could be run with the help of such compensation fund.
- (6) Large funds are being generated under compensatory Afforestation in the State. Most of the forest land that is diverted for development projects is in the vicinity of villages who are adversely effected by such transfer of forest land. Funds generated under this could be suitably utilized to strengthen and manage the Van Panchayats.
- (7) While drawing up management plans of VPs provision for supply of cooking gas and solar equipment must be made so that dependence on fuel wood becomes minimum.

Food diversity and feeding habit of Indian Trout, *Barilius (Opsarius) bola* from the Doon Valley waters of Uttarakhand.

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The genus *Barilius* belongs to the sub-family Rasborinae of the family Cyprinidae; usually known as Carps (Day, 1878). In the fishes of the this family the head and the body are usually compressed and, except in a few cases, the pectoral and the ventral fins are inserted along the sides and possess only one simple ray. There is no spine below the eye which has a free orbital margin or a gelatinous eyelid. The members of the genus *Barilius* are characterized by their compressed snout and anterior mouth. Moreover, they usually possess spots or vertical bars on the body. The bariline cyprinid fishes inhabit medium to fast torrential mountain streams, earning them "hill trouts". They are affected by the swiftness of current but are capable of progressing against it. On the rush of the water they seek shelter under rocks and stones at the bottom of hide under crevices along the edges of the streams (Raagam and Devi, 2005).

Considering the sporting qualities and also the shape of the body, mouth and the colour of *B. bola*, British anglers synonymised it with the trout, but to distinguish it from the real trout of their country, they called it the Indian Trout of family Cyprinidae. Taxonomically it has no relation with the real trout which belongs to a different family, Salmonidae and does not naturally occur in India (Kulkarni, 1992). The origin of the popular name, *Barilius (Opsarius) bola*, and the relative qualities of the fish are described by Thomas (1897).

Distribution

According to Lal and Chatterjee (1962), *Barilius bola*, is restricted to river Reh of Koal Kundi and river Song of Lacchiwala and Doiwala and is not widely distributed in Eastern Doon. The specimen of this fish collected by Hora (1937) was from the Song river from Lacchiwala in the Dehra Dun. It prefers to live in clear streams with rocky beds. Generally, it prefers junctions of streams or rapids at the head of pools. It has been observed to be a surface and column feeder.

In 2005, field observations on the biology of this fish was done by Rauthan *et al.* It breeds during early monsoon season in quite and inundated areas. The fish spawns once in a year i.e. March and April in the Doon valley.

Materials and Methods

For the purpose of the study, fishes were collected from different localities throughout the year from the drainage system of river Song. Immediately after the collection, the fishes were preserved in 2 to 3 % formalin solution till they were narcotized and dead. The dead fishes were subsequently transferred to 5% formalin solution. Samples of gut contents were obtained throughout the year at monthly intervals. Fishes were preserved in the field and than abdomen of each of the fish in the sample, was cut open longitudinally. The gut contents preserved were examined under stereo-microscope for identification of various groups of animals and plants. Various food items were identified as far as possible. The number of each item of food was listed by occurrence method (Pillay 1952).

Food and Feeding Habit

Barilius bola is a carnivorous fish taking aquatic insects, larvae and nymphs (Raagam and Devi, 2005). Insect components are taken more predominantly during the months of May–July. The fish remain in middle and upper strata of open water where there are no plants. The hill trout is high predacious and carnivorous. It is a school fish. The fish is essentially a column feeder. The specimens of this fish were dissected and the stomach contents of the fish contained shrimps, mud and nematodes. According to Kulkarni and Ogale (1978) they feed on small fishes such as *Rasbora*, *Chela*, *Salmostoma*, *Danio* etc. but it studiously avoids any dead ones among them even in small ponds. This endorses the presumption made by Hora (1937) that “the form and structure of its alimentary canal leaves no doubt that it is a highly carnivorous species”. Groundnut cake which is liked by most of the carps is disdained by this fish; neither does it take any green algae in water. However, the rapacious nature of the fish indicates that it might take artificial feed of animal origin after certain amount of training, as is found in the case of Murrels. The gut of *Barilius* shows a gradation from the herbivorous to the carnivorous condition, as the gut-length is considerably lesser than that of the truly herbivorous teleosts (Das and Nath, 1968).

i. INSECTS

Among insects, Diptera is a predominant item of food represented by mosquito larvae, pupae and adults. They occur more in January, March, June and October to December than in other months of the year. No Diptera are found in the month of February. Next less abundant group is Odonata which is represented by larvae and adult of Dragonflies. This group is represented more in October and comparatively to lesser percentage occur in other months of the year except in February when it is conspicuous by its absence. Other groups which show rare occurrence are Coleoptera, represented by water beetles and *Coccinella* sp. In the months from July to October. Trichoptera represented by Caddis fly larvae, Hymneoptera represented by ants and Thysanoptera represented by the Thrips.

ii. CRUSTACEA

Crustacea larvae are found very rarely, they occur only in the month of January.

iii. MOLLUSCS

The molluscan shells are rarely met within the gut of this fish except during months of January, May, June and July.

iv. NEMATODES

Nematodes, as parasites occur throughout the year.

v. SMALL FISHES

They feed on small fishes such as *Rasbora*, *Chela*, *Salmostoma*, *Danio* etc.

TABLE –

Table showing different food items present in the gut of *Barilius bola* Hamilton.

FOOD PARTICLES

1. Insecta

- a. Diptera (Mosquito larvae, pupae and adults)
- b. Odonta (larvae and adult of Dragon flies and damsel flies)
- c. Coleoptera (water beetles and *Coccinella* sp.)
- d. Trichoptera (caddis fly larvae)

- e. Hymenoptera (ants)
- f. Thysanoptera (thrips)
- 2. Crustaceans (Crustacean larvae)
- 3. Mollusca (shells)
- 4. Nematoda (Thread worms)
- 5. Small fishes such as *Rasbora*, *Chela*, *Salmostoma*, *Danio* etc.
- vi. SAND PARTICLES

In addition, to the above food items, sand particles also occurred frequently in the gut. They occur throughout the year. Maximum occurrence is recorded in June and July.

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Forests in today's world

***Subir Mario Chowfin**

Forests are playing an increasing role in today's world for their role in Carbon Sequestration and Wildlife Biodiversity. Recent Research conducted in the production forests of Deramakot and Tangkulap, Sabah, Malaysia analyzed the effects of the combination of Sustainable Forest Management (SFM) together with Reduced Impact Logging (RIL) and Forest Certification. Reduced Impact Logging consists of careful pre-harvest planning and improved harvesting techniques and also involves reduced harvest and post-harvest silvicultural treatments. SFM is a broader management concept which combines RIL techniques with a longer cutting cycle in the management unit. The research found that forestry practices are generally destructive when applied to pristine forests but most forests in a landscape are degraded and when SFM is applied to these degraded forests it proves beneficial for Carbon Storage as well as wildlife biodiversity.

In the context of Uttarakhand, we can boast of a large forest resource with Protected Areas and Van Panchayats. Our forests range from sub-tropical to alpine meadows also known as bugyals. They provide valuable forest products like resin and fodder. They also play an important role in soil and moisture conservation as well as shelter for many wild flora and fauna, medicinal and aromatic plants as well as being a vital part of the state's eco-tourism structure.

However, degradation of forest landscapes in the hills of Uttarakhand have also led to increasing water problems in many villages, increasing animal – human conflict and a lesser quality of life. Perhaps the management of these degraded landscapes incorporating practices such as Sustainable Forest Management and Reduced Impact Logging as demonstrated in the tropical forests of Malaysia would prove beneficial in slowing down the degradation of these forests.

While the state is undertaking development in a progressive manner if equal attention is paid by policy makers and planners to the core problems in the mountains of Uttarakhand which are largely dependent on forest and forest resources through better planning, management and budgetary allocations for these forest landscapes the people of Uttarakhand would benefit as a whole.

An Account of Mammalian Fauna in Jaisamand Wildlife Sanctuary, Udaipur, Rajasthan, India

B. L. CHAUDHARY*, SUNIL DUBEY**

ABSTRACT:

The Jaisamand wildlife sanctuary having a total area of 52.342 Sq. km is situated at 50 Km south of Udaipur City, Rajasthan. The sanctuary represents rich diversity of plants and animal species, many of them are of rare varieties. In the past the animal species included Lion, Tiger, Wolf, Wild Dog, Sambhar, Sloth Bear, Otter, Four-horned Antelope, Black Buck, Golden Mongoose etc which have gone extinct in the sanctuary as well as from the region. The geographical peculiarities rendered the sanctuary a resting place for migrating animals during earlier times. The human intervention caused local extinction of species mostly through the habitat destruction. The current study presents an account of available mammalian species along with their local status in the sanctuary. A total of 21 mammalian species were recorded till date. Nearly 52% of them are Less Common and about 19% are Rare. There is urgent need to focus on effective conservation plans to protect the mammalian fauna of the sanctuary.

Key Words: rare, human intervention, local extinction, habitat destruction, conservation.

1. INTRODUCTION : The Jaisamand wildlife sanctuary is situated at 50 Km south of Udaipur between $73^{\circ}37'$ to $73^{\circ}40'$ east longitude and $24^{\circ}35'$ to $24^{\circ}39'$ north latitude, with a total area of 52.342 Sq. Km. The area was declared wildlife sanctuary by the Government of Rajasthan notification number F 39 (2) Forest, dated 7th November 1955 under the provisions of section 5 of Rajasthan Animals and Birds Protection Act, 1951. Till 1979 the sanctuary area remained under the control of the Divisional Forest Officer and then it was transferred under the control of Wildlife Division of the Department of Forest, Udaipur (Bhatnagar R and K S Gupta, 2004). The Jaisamand Forest area is divided into two blocks namely Block Maniyol (45.9355 Sq Km) and Block Dhuniwala (06.4065 Sq Km). Asia's second largest artificial lake 'Jaisamand' (Dhebar Lake) forms an integral part of the sanctuary. The Jaisamand Lake measures 14 Km in length and 9 Km in width with a circumference of about 88 kms. The topography of the sanctuary area consists of undulating broken ranges of hills, plains and pediment zones. (See Figure 1 – Outline Map of Jaisamand Wildlife Sanctuary). The climate of Jaisamand forest area is Sub-tropical type with hot summers and moderate winters. Rainy season persists from June end to September end with average number of 15-20 rainy days. The area was earlier managed by the erstwhile rulers of 'Mewar' prior to independence. At that time the area was rich in forest wealth and wildlife and the rulers used it as a 'Shikargah' (hunting ground) (Ojha S. 1886). The tiger formed the apex species of the food chain which was an evidence of the rich biodiversity of the area (Ojha G. H. 1928). After the independence, the abolition of state rules and ineffective legal provisions led to the rapid destruction of wildlife that continued till late 60s (Agarwal B.D. 1979). The overall result was extinction of many large mammalian species and the present fauna represents remains of prior conditions and require urgent attention for their protection. The

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following discussion focuses on assessing the current faunal species with the particular focus on mammalian species in the sanctuary.

2. METHODOLOGY:

To assess the present mammalian diversity of the sanctuary, several field surveys were conducted during March 2005–June 2009 and the data was gathered as follows:

2(a) Total Species List: The earlier records of the floral species of the sanctuary were accessed.

2(b) Survey: The area was surveyed in two ways:-

- (i) **Walking on existing known forest tracks** and fire lines and recording the observed species.
- (ii) **Walking on the unknown tracks**, off the tracks into thickets and recording the observed species.

2(c) Collection and identification of indirect evidences: other evidences like scats, pugmarks, scratch marks, remains of kill and dead, urine marks, chewed vegetation, calls were recorded and an attempt was made to identify the species with help of literature and consultation with experts.

2(d) Recording Status: The occurrence status of species was recorded on the basis of frequency of sighting and frequency of indirect evidences during the survey. The status was determined as follows:

Abundant – 80-100 % frequency; Common – 50-80 % frequency; Less Common – 20-50 % frequency; Rare – 00-20 % frequency.

3. RESULTS:

3(a). The Previous Fauna and its Decline:

During the late period the mammalian fauna of the area consisted of Lion (Burke W.S. 1928), Cheetah (Ojha S. 1886), Tiger, Panther, Wolf, Wild dog (Tehsin R.H. 1986a & b) etc among the top carnivore species and Sambhar, Four-horned antelope, Black Buck, Chinkara, Cheetal, Wild boar, Bear, Blue bull etc among the herbivore species. The Jaisamand forest served as an ideal resting place for the migratory animals like Tiger and Wild dog that used to migrate from the forests of Kamlighat and Goramghat of Pali district to Madhya Pradesh, passing through the Jaisamand forest area. It is evident that Jaisamand forest then had plenty of herbivore fauna from the fact that wild dog that moves in large groups require a large number of prey species to sustain upon. During 1923 a group of wild dogs was seen hunting a Cheetal (*Axis axis*) in the Jaisamand forest (Tehsin R.H. 1986a & b).

The lake harbored Otters till 1977 and the Bear existed in the forest till late 90s (Punaji, personal communication).

3(b). The Present Fauna:

The field survey and examination of existing data reveals extinction of macro fauna including Lion, Tiger, Cheetah, Wild dog, Sambhar, Sloth Bear, Four-horned Antelope, Wolf, Black Buck, and the Golden mongoose.

A total of 21 mammalian species were identified in the sanctuary. Among them, Panther (*Panthera pardus*) forms the apex species. Other mammals include Chinkara (*Gazella gazelle*), Spotted Deer (*Axis axis*), Wild Boar (*Sus scrofa*), Hanuman Langur (*Presbytis entellus*), Striped Hyena (*Hyaena hyaena*), Indian Pangolin (*Manis carassicaudata*), Indian Porcupine (*Hystrix indica*), Indian Fox (*Vulpes bengalensis*) etc. (See Table-1: Mammals of Jaisamand Wildlife Sanctuary). Out of the 21 mammalian species identified, about 19% (04 species) were recorded rare whereas

nearly 52% (11 species) appeared to be less common in the sanctuary area. About 14% (03 species) are common, similarly, nearly 14% (03 species) were recorded common. Even, Blue Bull (*Boselaphus tragocamelus*) which is a menace in some other areas has gone extinct and was reintroduced in the sanctuary during 2003, as it is revealed from the management plan of the sanctuary (Bhatnagar R and K S Gupta, 2004).

There appears to be correlations between the declines of pray species & their predators, according to the trophic balance of an ecosystem.

4. DISCUSSION:

The geographical setup of the Jaisamand Wildlife Sanctuary provides an excellent habitat for all kinds of fauna. There are several causes, mostly anthropogenic, responsible for decline of mammalian diversity in the sanctuary. The wildlife corridor detached from all sides and now remains an isolated forest patch with the left over biodiversity.

The past glory of the Jaisamand Wildlife Sanctuary cannot be obtained but the left over needs well planned, long term conservation efforts. Redefining the sanctuary area into different zones for protecting micro habitats is essential. Constructive efforts are also needed to redevelop the Jaisamand forest into wildlife corridor for linking it with other protected areas and to facilitate gene flow. Strict legal provisions and proper surveillance system is required for checking the human interference. At the same time, the field staff of forest department should be increased and be provided with facilities for communication, distant vision, self protection items including weapons and proper conveyance mode for proper monitoring & surveillance of the sanctuary area. People's involvement in some efforts will help in developing concern for the conservation of biodiversity.

5. ACKNOWLEDGEMENT:

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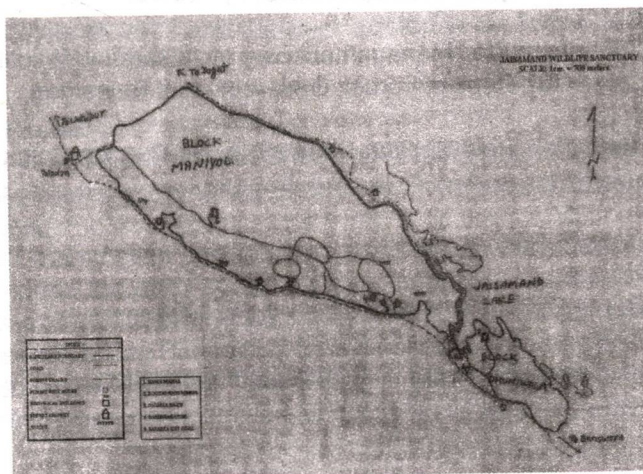
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Table-1: Mammals in Jaisamand Wild Life Sanctuary, Udaipur, Rajasthan, India (with Local Status)

S. No.	Scientific name	English Name	Local Name	Status
1.	<i>Panthera pardus</i>	Panther	Cheetra	L
2.	<i>Hyaena hyaena</i>	Striped Hyena	Jharakh	L
3.	<i>Felis chaus</i>	Jungle Cat	Jungli minki	L
4.	<i>Paradoxurus hermaphroditus</i>	Toddy Cat	Viju	R
5.	<i>Vivarcula indica</i>	Indian Small Civet	Viju	R
6.	<i>Vulpes bengalensis</i>	Indian Fox	Lonkdi	R
7.	<i>Canis aureus</i>	Jackal	Shiyal	L
8.	<i>Sus scrofa</i>	Wild Boar	Bhund	L
9.	<i>Boselaphus tragocamelus</i>	Blue Bull	Roj, Neelgai	L
10.	<i>Gazella gazella</i>	Chinkara	Chinkara	L
11.	<i>Prebytis entellus</i>	Common Langur	Vandra	L
12.	<i>Hystrix indica</i>	Indian Porcupine	Heli	L
13.	<i>Lepus nigricollis</i>	Indian Hare	Hanhan	C
14.	<i>Manis carassicaudata</i>	Indian Pangolin	Halahooda	R
15.	<i>Sunchus murinus</i>	Grey Musk Shrew	Chhachhunder	C
16.	<i>Cyanopterus sphynx</i>	Bat	Samisulia	L
17.	<i>Pteropus gigenticus</i>	Flying Fox	Bagal	A
18.	<i>Herpestes edwardsi</i>	Common Mongoose	Noliyo	C
19.	<i>Herpestes smithi</i>	Ruddy Mongoose	Bhundra	L
20.	<i>Funambulus pennanti</i>	Five striped Palm Squirrel	Khiskoli	A
21.	<i>Rattus rattus</i>	House Rat	Oondra	A

Index:

Local Status: **A** = Abundant, **C** = Common, **L** = Less common, **R** = Rare.



Eco-biological studies on a hill stream fish *pseudecheneis sulcatus* (McCelland) in Bhilangana River of Garhwal Himalaya.

J.V.S. Rauthan, Geeta Rauthan, R.S. Bisht, Sangeeta Rawat, Bhavna Sharma, and Leela Negi

ABSTRACT

During present studies *Pseudecheneis sulcatus* (McCelland) is well adapted to life in turbulent water of rocky hill-streams. It is bottom living fish and found adhering to the stones with the help of the adhesive thoracic apparatus and striated paired fins. The bottom living habit of the fish is supported by the broadening of head, dorso-ventral flattening of the anterior part of the body. The fish is well adapted for living in fast flowing hill streams and the rivers of the Garhwal. It is insectivorous and bottom feeder fish. The breeding period of this fish commences from July and continues upto October

INTRODUCTION

Pseudecheneis sulcatus is found abundantly in all the hill streams and rivers of Garhwal Himalaya. A review of literature reveals that no much record is available on the ecology of these species. The bio-ecology of hill-stream fishes of Garhwal Himalaya has been studied by Baloni (1980), Badola and Singh (1980, 1984), Bahuguna and Singh (1981), Dobriyal (1983), Sharma (1988), Dobriyal et.al. (2000) and Rauthan et.al. (2001, 2002, 2005). In present study the habit and habitat, food and feeding habit and breeding period of this species has been studied in detail.

MATERIAL AND METHODS

The fish collection made at intervals extending over a period of two years from different localities at Bhilangna river near Pilkhi and Ghansali (Tehri Garhwal), with the assistance of local fishermen, operating cast net, drag net, mahajal, gill net, hook and fry collection nets. Besides a few species were purchased from local fish market.

Observations

1. **HABIT AND HABITAT** – *Pseudecheneis sulcatus* is well adapted to life in turbulent water of rocky hill streams. It is a bottom living fish and found adhering to the stones with the help of the adhesive thoracic apparatus and striated paired fins. The bottom living habit of the fish is supported by the broadening of head, dorsoventral flattening of the anterior part of the body, presence of adhesive thoracic apparatus on the thorax and horizontal position of the paired fins. All these structural modifications help the fish in adhering to the stones at the bottom of the river and stream bed. The fish darts from stone to stone in search of food and shelter and always prefers stony beds. The temperature tolerance of this species ranged from 90C to 250C. The fish is found in the waters where concentration of dissolved oxygen ranges from 8.2mg⁻¹ to 13.3mg⁻¹

FOOD AND FEEDING HABIT

It is an insectivorous and bottom feeding fish. The food identified in its gut contents, consists mainly of larvae and nymphs of the aquatic insects such *Cardina* sps., *Eubranchipus* sps., *Euqammarus* sps., *Macroprachium* sps. Beetle sps., *Epsorus* sps., *Iron* sps., *Heptagenia*, *Lestes oranemorae*

ornatrum sps., Perla sps., Dinarthrum sps., Glossosoma sps., Leptocells sps., Notanatalica sps., Halopates sps., corixe sps., etc.

The algae cladophora, oedogonium and spirogyra and diatoms Cymbella, Fragilaria, Navicula and Synedra are found in few isolated cases. The fish shows a fluctuating rate of feeding, the lowest during winter months (December, January and February) and July to September. This coincided with the low temperature and the spawning period of the fish and turbidity in the hill streams. During spring and early summer the fish feed voraciously. The maximum feeding period is from October to November. The variation in feeding intensity appears to be correlated mainly with the availability of food, temperature, turbidity, spawning and post spawning period of the fish. The bottom feeding habit of the fish evidenced by the ventral position of the mouth lying considerably behind the tip of the snout and presence of sand particles in appreciable quantity in the gut contents, throughout the year.

While feeding the fish attaches itself to the rocks and stones of the adhesive thoracic apparatus or by pectoral fins. Its mouth is free to feed all the time. The food is located with the help of thick and papillated lips. The upper lip is applied over and in front of the prey, the slit like small mouth is opened. by the movement of lower jaws, the lips are then closed over the prey. The numerous sharp, recurved and conical maxillary teeth, which are also sharp and inwardly directed are applied on the prey. After closing the mouth a contraction of the buccopharynx causes the swallowing of the prey into the capacious stomach. The teeth of buccopharynx prevent the escape of the prey. They do not tear it into pieces because they have no masticatory surfaces. Mouth is small surrounded by thick lips, and studded with feeder because the eyes are minute. The papillated lips help in detecting the food at the bottom of the streams. The buccal cavity is spacious. The roof of the buccal cavity is furnished with numerous minute and inwardly directed teeth present on the premaxilla and prevomers, corresponding to premaxillary teeth, mandibular teeth are also present on the dentary. The gill rakers form a board sieve like structure, preventing the escape of large particles of food. The superior and inferior pharyngeal teeth are also present. The Oesophagus is a long and distensible tube. It is followed by stomach which is thick walled, sac like and 'U' shaped. It is divisible into two parts (i) the anterior narrow cardiac part which becomes widened behind to form the fundus (ii) the distal narrower pyloric portion. The stomach serves for temporary storage of food and digestion. The intestine is relatively short and extends from the pylorus to anus. It runs parallel then turns back and runs posteriorly to the anus. The intestine is thick walled and undulating with its anterior part a little wider than the rest. The ventral position of the mouth which is considerably thick is, studded with papillae. The fish is touch and taste feeder because the eyes are minute the papillated lips help in detecting the food at bottom of the stream. Various structures in the bucco-pharynx such as the position of mouth, teeth nature of the food of fish. There is a high degree of similarity in the mechanism and intensity of feeding, structures associated with the buccopharynx and alimentary canal to those of *Glyptothorax* sps. the length of alimentary canal in the size range of 110-184 mm was found to range between 90-164 mm and the relative of the gut range between 0.6617 to 1.058 times in the total length. Various structure in the buccopharynx such as the position of mouth, teeth and gill rakers are closely related to the nature of the food of fish.

Breeding period

The breeding season of the fish begins from July and runs upto September. The fish migrates upstream in shallow stony beds in the side waters. A large number of fishes make their appearance during this season.

A large number of oozing females and milting males are found in the nearby paddy fields which migrate from the stream to paddy fields by canal water. The ovaries are paired, elongated structures situated in the posterior half of the body cavity. The anterior ends of the ovaries are free but they are

fused posteriorly. The common oviduct opens out through the genital aperture. The ovaries are devicate, flaccid, and translucent structures with a smooth surface during early growth phase, but as maturity advances bulging ripe ovary became apparent and in part it gave a beaded appearance. The weight of the ovaries increases gradually and reaches its maximum in June and July. It decreases in successive months and attains the minimum in November. The ovaries become thin, flaccid and translucent after spawning, but in a gravid fish they are swollen and turgid due to presence of yolk laden ova. The ovary possess mature ova in the different stages of maturity except some undifferentiate ova that are present in the ovary throughout the year. The colour of the ovaries is dull brown after spawning and yellowish during the breeding season.

Generally the males are larger than the females. The largest male recorded during this study is 182mm and female 160mm. The minimum size at the first maturity for male and female is 112mm and 102mm respectively. The fish breed in the monsoon season when water temperature ranges between 20.0°C – 25.0°C with cool and cloudy rainy days. Fry were collected only during August to October in large numbers. The diameter of mature ova ranges between 0.988 to 1.9470 mm. The fecundity of the fish in the size range between 112 mm to 160 mm was found to range between 190 to 800 mm depending upon the size and age of the individual female.

Discussion

The present study in the Garhwal Himalaya revealed that *Pseudecheneis sulcatus* in an insectivorous, and bottom feeder. It feeds on aquatic insects and their larva and nymphs. The algae and diatoms are found rarely in the gut contents. In other sisorids of the genus *Glyptothorax* such as *Glyptothorax garhwali* (Tilak), Baloni (1980) reported that it is a bottom feeder and insectivorous fish. Similar observations were made by Sulba and Das (1970), Nath (1976) on *Glyptothorax kashmirensis* and Sharma (1983) on *Glyptothorax pectinopterus* Rauthan et.al.(2003) studied similar result in hill stream fish *Clupisoma montana*. The relative length of the gut is 0.6617 – 1.058mm in *Pseudecheneis sulcatus*. According to Nath (1976), Sharma (1983) and Rauthan et.al. (2003) the relative length of the gut is 1.12 and 0.835 to 0.942 and 0.5110 to 1.213, in *Glyptothorax kashmirensis*, *Glyptothorax pectinopterus* and *Clupisoma montana* respectively. Pre-spawning starvation has been recorded both in male and female of this species. Similar results has been made by Baloni (1980), Grover (1982, 1979) Dobriyal and Singh (1987). The breeding period of fish commences from July to early October the fish spawn several times in a breeding season as is evidenced by the presence of ova in different stages of maturation. In other sisorids such as *Glyptothorax garhwali* the breeding period extends from July to early October, and in *G. pectinopterus* from June to August (Khanna and Pant 1967). In male the testes are paired, elongated and fused together in the mid line. Each testis consists of biserially arranged testicular follicles which are profused overlapped with each other. Posteriorly the testes form a single vas deferens which is connected with the genital papilla. Similar observations has been made by Baloni (1980), Grover (1972, 1979), Baloda and Singh (1980). Bahuguna and Singh (1981), Dobriyal and Singh (1987), Dobriyal et al. (1990) and Rauthan et al. (2003, 2005).

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From the Archives of Cheetal

The Tiger and Its Prey

By George B. Schaller

Modern man tends to look at wolves, lions, tigers, and other large predators with a deep-seated antipathy and intolerance. In part, this may be the result of descriptions such as the following one by Theodore Roosevelt of a puma cornered by hunter: "the big horse-killing cat, the destroyer of deer, the lord of stealthy murder, facing his doom with a heart both craven and cruel." In this one sentence he not only denounced the supposed character of predators and emphasized the fact that they occasionally cause economic losses by killing livestock, but he also intimated that they are detrimental to deer and other wildlife populations in which man has a vested interest.

Although it can logically be assumed that the large predators exert an influence on prey populations, studies to determine the extent of that influence have rarely been made. Do they kill animals of all ages indiscriminately? What percentage of the prey population do they remove each year? How often do they kill, and what is the size of their daily food in-take? These and many other questions must be answered before the effects of predation can be assessed.

During 1964 I studied the tiger and its prey in Kanha national Park, a small nature reserve in the highlands of central India. In the past few years the increase in the number of tigers in the park, coupled with a decrease in the number of deer, led some of the forest rangers there to the conclusion that the cats were responsible, and a reduction in their number was contemplated. One of my tasks was to find out if a predator control program was justified.

My study area was a broad valley in the center of the park—some twenty square miles of forest broken by meadows of varying sizes and surrounded by a low range of hills on three sides. The forest in the hills was stunted, and the trees were mostly deciduous, dropping their leaves during the hot months of the year. In the lowlands, on the other hand, the forests consisted primarily of tall sal trees, whose larger, ovate leaves provided shade at all times. Working conditions in the valley were in many ways ideal. In contrast to most other Indian forests, disturbance by man and livestock was relatively slight. Wildlife was abundant, and much of it was concentrated there, particularly during the hot season from March to June when the available water consisted of a few pools and temperature in the shade were 110°F.

The tigers in Kanha park had their choice of a wide variety of wild prey animals. The most abundant of these was the chital, or axis deer, a lovely animal about the size of a white-tailed deer, with a spotted coat. Some six hundred chital resided in the study area, preferring the edge of the forest, where at dusk and dawn they appeared in herds numbering anywhere from four or five to more than one hundred.

A second species of deer was the stately barasingha, a close relative of the European red deer. In 1964 only about eighty barasingha still survived in the park. Their large size, sociable habits, and predilection for grasslands on which to court, feed and rest make them such an easy target for the poacher's gun that the species has almost been exterminated in India.

The largest, as well as the most elusive, deer was the sambar. Although some fifty to sixty of these wapiti-sized animals resided in the area, I did not see them often, because the small herds—rarely comprising more than four individuals—retreated into dense forest during the day.

The gaur, a form of wild cattle, were represented by about 125 to 150 animals. These impressive bovids—the bulls reach a shoulder height of 6 feet and a weight of 2,000 pounds—are, like the sambar, primarily nocturnal. Herds, numbering five to twenty individuals each, commonly graze on

the meadows until dawn and then withdraw into the bamboo thickets on the slopes of the hills. Wild prey of minor importance include langur monkeys, the small barking deer, pigs, porcupines, and a few other species.

the most abundant hoofed animals in India, and also the tigers' most important source of food throughout the country, are the domestic cattle and buffalo, millions of which roam the forests unattended. Fortunately, only about sixty of them were in my study area, in contrast to the edge of the park, where over 2,500 grazed.

The easiest means of determining which of these potential prey animals the tiger eats, and the extent to which it does so, is to examine its feces, or droppings. In eating an animal the tiger devours the skin and hair, bone splinters, and sometimes hoofs and teeth, all of which can be used to identify the victim. I collected and examined 335 droppings (table 1). In over half of them the remains of chital deer were found, followed by sambar, barasingha, gaur, and domestic livestock, in that order. These animals formed the great bulk of the tiger's diet.

The late Paul Errington generalized that 'the large-seized wild ungulates (hoofed animals) suffer from subhuman predation chiefly when immature, aged, crippled, starved, sick, or isolated from their fellows'. Studies on wolves in North America have tended to support this contention. Adolph Murie, for example found that the wolves of Mount McKinley National Park, Alaska, killed mainly the young, old, and diseased Dall sheep, leaving the most vigorous adults to propagate; L. Mech came to a similar conclusion after observing the interactions between wolves and moose on Isle Royale, in Lake Superior, Michigan. Wolves hunt largely by running down their prey, whereas the tiger stalks its victim, before attacking with a final short rush.

Table 1

Frequency of occurrence of food items in 335 tiger feces collected in the study area, Kanha Park in Calendar year 1964.

Food Items	Frequency of Occurrence		Food Items	Frequency of Occurrence	
	No. of feces	%		No. of feces	%
Chital	175	52.2	Grass	8	2.3
Sambar	35	10.4	Domestic buffalo	6	1.7
Barasingha	29	8.6	Pig	3	.8
Gaur	28	8.3	Frog	1	.3
Langur Monkey	21	6.2	Eggshell	1	.3
Domestic Cattle	20	5.9	Termite	1	.3
Soil	13	3.8	Fruit	1	.3
Porcupine	9	2.6			

I depended a good deal on teeth to determine the ages of the animals killed by tigers. Premolar and molar teeth erupt in a definite sequence when the animals are young, and wear down over the years. A relative age can be assigned to animals killed by predators on the basis of tooth eruption and wear. I established nine age classes, ranging from class I, young less than one year old whose second and third molar teeth had not yet erupted, to class IX, old animals with the cheek teeth worn close to, or down to the gumline. However, predators usually consume the soft, weak bones of young animals (those in class I) so completely that they are rarely found. This tends to bias the results considerably. But the death rate can be computed in another way: the loss in class i equals the difference between the total number of young born and the number surviving to enter class II. This calculation showed that about 50 per cent of chital, sambar, and gaur young failed to reach one year of age—a greater proportion of these animals died while young than at any other time. The barasingha

had very few off-spring-only six were counted-but this was probably due mainly to brucellosis, a bacterial infection causing spontaneous abortion of the fetus, rather than to predation.

Table 2

Number of predator kills in each age class of 3 species of deer (excluding fawns in class I).

Age class	Chital		Barasingha		Sambar	
	No.	%	No.	%	No.	%
II	10	11.0	3	9.0	1	2.0
III	8	8.5	4	11.5	7	13.0
IV	7	7.5	7	20.0	2	4.0
V	14	15.0	5	14.0	3	6.0
VI	9	9.5	4	11.5	6	11.5
VII	21	22.0	7	20.0	14	26.0
VIII	16	17.0	5	14.0	14	26.0
IX	9	9.5	0	0	6	11.5
Total	94	100.0	35	35.0	53	100.0

The death rate of animals one year old and other showed some important differences between species (Table 2). Chital and sambar of all ages fell prey to tiger, but seemingly the greater proportion of these were the older, rather than the prime, animals. On the other hand, the predators removed deer of all ages about equally from the small barasingha population. Only a small percentage of deer kills were in the oldest age class (IX), and it is likely that few, if any, of them escape the tigers long enough to die of old age. In contrast, tigers killed adult gaur infrequently. The remains of only eight large gaur were found, even though the skeletons are far more-conspicuous, and thus easier to find, than those of deer. Undoubtedly the large size and formidable horns of the gaur deter the cats except under the most favorable circumstances. (For example, I once watched a tigress stalk a bull gaur, but suddenly she changed her mind and walked away; on another occasion a bull threatened a tigress with his horns before retreating from her slowly without being molested).

The various sources of information thus led to the conclusion that although tigers culled the less fit animal-mostly the young ones, but also the older ones, except the gaur-from the populations, many in the prime of life were also taken. Some of the latter were females that had lost their agility in late pregnancy, but others had no obvious handicap. None appeared to have been weakened by disease or starvation.

For a meaningful study, it was also necessary to compute the total amount of wildlife killed by predators during the year. To do this, the size of the prey population, the yearly death rate, and the approximate weight of the animals taken must be known. The mortality rate of the young has been mentioned earlier, but not that of the adults. As a general rule, in a stable population the number of deaths among adults roughly equals the number of young animals entering the population as one-year olds. The adult sambar had an annual death rate of about 13 percent, and their numbers seemed stable. the chital and gaur increased slightly and had an estimated mortality rate of 20 and 5 per cent, respectively. The barasingha decreased by 33 per cent because too few fawns survived to offset the loss of adults to tigers.

The mortality figures can be converted into the actual number of animals killed and also into their total weight (Table 3). The table includes nineteen domestic cattle and buffalo, which the

tigers are known to have eaten in the study area. Thus the predators, including tigers, an occasional leopard, and some poachers, removed an estimated 50,625 pounds of animals from the study area during 1964. Such food items as monkeys and pigs provided an additional few hundred pounds at most.

Now, the most accurate means of determining the amount of food required by tigers during a year would be to follow them for days and weeks. This is hardly feasible, for tigers usually hunt alone at night and are very shy, keeping mostly to dense thickets and ravines. Their nightly meanderings in search of a victim may take them for 15 or more miles within an area of at least 25 square miles. One night a tigress with four cubs killed a chital buck. The family caught nothing further the following night, but on the third night the tigress attacked a buffalo that had strayed from a village. She and her cubs consumed this animal in two nights. They had killed twice in four days. But I was rarely able to make such observations, and had to rely on indirect means to derive a food consumption.

Table 3

Estimated number and weight of main prey species taken by predators Calendar year 1964.

	Young		Yearling & Adults		Total weight in pounds
	Estimated No. taken by predators	Total estimated weight in pounds	Estimated No. taken by predators	Total estimated weight in pounds	
Chital	115	5700	85	10625	16375
Barasingha	0	0	27	9450	9450
Sambar	15	1500	6	2400	3900
Gaur	25	5000	7	9100	14100
Domestic Cattle	3	450	11	3850	4300
Domestic Buffalo	0	0	5	2500	2500
Total		12700		23925	50625

It is clear that a tiger can eat a prodigious amount during the course of a night, as the weights of freshly killed animals before and after a meal showed. For example, in one night two tigresses devoured 89 pounds of meat-about 44½ pounds each-from a cow. In a similar situation, a tigress with four small cubs ate 85 pounds from a gaur. Although an adult tiger, weighing 250 to 400 pounds, can consume 40 to 60 pounds of meat at a time, this gives little indication of the cat's need on a long-term basis. The tiger is adapted to a feast or famine regime-several days sometimes pass without it being able to secure food. Although the animal has a seemingly unbeatable array of weapons with which to capture its prey-acute senses, tremendous strength, and formidable claws and teeth-the wild hoofed animals also have their defenses, particularly a good sense of smell and great speed. As a result, the tiger must work hard for its meals, roaming many miles nightly and making numerous unsuccessful attempts before finally surprising a potential meal.

A typical hunt went as follows: (5:57 p.m.), a male tiger strode out of the forest and ambled over a stretch of meadow into a tree-fringed ravine. A langur monkey barked in alarm on seeing him. The tiger advanced about 300 feet up the ravine, entered a patch of forest, and moved to the edge of a piece of grassland on which about 60 chital and barasingha grazed. From 6:12 to 6:20 p.m. he stalked up a shallow ravine that wound partly across the meadow, attempting to get close to the deer. Suddenly a chital barked and so did a barasingha; both had sensed the hidden tiger. Another barasingha barked back hoarsely, and the whole herd fled. They stopped abruptly, then stood and watched the

cat as it emerged from the ravine 150 feet away, secure from attack at that distance. The tiger emitted several muffled roars, as the cats often do after an unsuccessful stalk, and departed.

Tigers in zoos are kept in good condition on about 8 to 12 pounds of meat per day. In the wild, where they are more active, 12 to 15 pounds of meat per day are probably sufficient. At this rate of consumption a tiger needs 4,380 to 5,475 pounds of meat per year. However, parts of each animal are inedible, mainly the stomach contents and most of the bones. These comprise about 30 per cent of the total weight of a deer or other large prey. If the tiger consumes some 70 per cent of the total weight of its victim, it must kill about 6,257 to 7,821 pounds of prey per year to sustain itself. This amount represents a minimum and presumes that the tiger devours all edible parts of the carcass. Unless disturbed by man, this is usually the case, for the tiger camps, so to speak, by the remains-for days if necessary – until the last rotten scrap of meat has been eaten.

The patterns of black stripes on the faces of the cats, particularly those directly above each eye, are so distinctive that it was possible for me to recognize every tiger in the study area individually. A male tiger and a tigress resided there permanently. Two other tigresses used the area sporadically, as did at least seven transients-wandering adult tigers that stayed a few days to a few weeks and then disappeared. The amount of prey killed by these nine transient animals was probably equal to that taken by 2½ resident adults.

There were also five cubs, four belonging to one tigress and one to another, each of which probably needed about half as much meat as an adult. Thus the area supported the equivalent of 6½ to 7 adult tigers, which required a total of 40,670 to 54,747 pounds of prey during the year. The food requirement of these tigers was roughly similar to the 50,625 pounds computed as the total mortality of the main prey species. Illegal killing of wildlife by the local peoples also accounted for a few pounds.

What, then, was the actual effect of the predation on the wildlife populations? All evidence indicates that the tiger was the main factor limiting the growth of the deer and gaur populations during 1964, and that my small study area contained almost as many tigers as the prey could support. But in spite of the heavy predator pressure, all species except the barasingha remained stable or increased slightly in number. If extensive hunting by man had been added to the existing natural predation that year, the prey would have been unable to maintain its numbers. Judging by the frequency with which I found old snares and other signs of poaching, the villagers did a great deal of hunting in the park in 1963 and earlier. This poaching, plus the killing by tigers, was undoubtedly the cause for the general decline of the deer. Interestingly, gaur are not regularly poached, primarily because of their resemblance to sacred cows, and they have been increasing steadily in recent years in spite of the numerous tigers in the vicinity.

The tigers in the area subsisted for the most part on wildlife, although they also took some 6,800 pounds of livestock. In other parts of the park, where deer were scarce, the cats fed almost wholly on cattle and buffalo. Without the easily available livestock as prey, the one tigress with four cubs in the study area might not have been able to secure enough food during the 1½ to 2 years that it takes to raise a young from birth until it is large enough to hunt consistently on its own. Tigresses are rarely accompanied by more than two cubs. The others apparently die from starvation and possibly disease or other causes. Thus the livestock is an important buffer that maintains the tigers at an artificially high level—a level the wildlife alone could not support. The sudden removal of all livestock would for a time raise the predator pressure on the wildlife. The sudden removal of all livestock would for a time raise the predator pressure on the wildlife, possibly preventing its increase. It might also cause a movement of tigers out of the area.

Another important concept needs consideration. Errington stated that "regardless of the countless individuals or the large percentage of population that may annually be killed by predators,

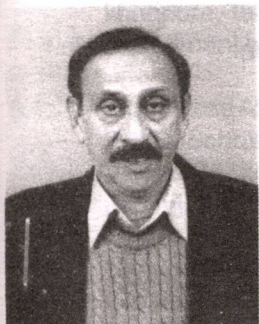
predation looks ineffective as a limiting factor to the extent that transspecific self-limiting mechanisms basically determine population levels maintained by the prey." That is, populations of hoofed animals will tend to increase in size in spite of predation, if they are large and healthy, until their ultimate level is determined by such factors as disease and availability of food. Individuals that fail to die from one cause will merely succumb to another.

The tiger population may also be self-limiting. Intolerance between tigers that meet on the trail or share a kill, as they occasionally do, possibly spaces out individuals regardless of the abundance of prey. When, for instance, almost all wildlife at Kanha was concentrated into a few square miles near the waterholes during the hot season, the number of tigers in the area did not increase. It is likely, too, that when a predator population passes its optimum level, reproduction declines or stops, as may have been the case with the wolves on Isle Royale. Females may abandon their young and they may have smaller litters than usual, as has been reported in the lion. These are all means of population control.

The interrelations between a predator and its prey is exceedingly complex, and a brief study can do little more than hint at answers. Wildlife populations are never static. Not only are there natural dynamic changes in the populations, but such factors as poaching by man and grazing by livestock contribute to the instability. Conditions in Kanha Park may well have changed drastically since 1954, and my conclusions from there may not be applicable to other areas. But studies such as these refute the population formula of predation that can be written somewhat facetiously as Tiger + Deer = Tiger. This oversimplification can be replaced with the concept that the large predators in themselves rarely, if ever, have long-lasting serious effect on a healthy prey population.

Cheetal Quarterly News

Dr. Ranjit Bhargava, Life Member of WLPsi is awarded :PADMA SHRI:



Life Member of The Wild Life Preservation Society of India and a leading environmentalist of the country, Dr. Ranjit Bhargava has been awarded the "Padma Shri" this year. Having played a pivotal role in several NGO's and Government Committees for over 45 years. Dr. Bhargava has also been Chairman WWF, U.P. State, Convenor INTACH U.P. and Uttarakhand, and Hony. Advisor for Environment, Ecology and Heritage, Army Central Command. In 1980 he was awarded "The order of Merit by Germany and in 1998 he received "The Order of the Golden Ark" from the Netherlands.

Annual General Meeting of WPSI held and Members of Executive Committee and office Bearers of the Society Elected

A general meeting of Wildlife Preservation Society of India was held in its office, 7 Astley Hall on 14 March 2010 in its office in which 13 members of the Society were present. The minutes of the meeting have been circulated to the members.

In both the meetings appeal was made to members to donate generously to the society and a Cash donation of Rs. 5000/- was received. In addition a donation of Rs. 1000/- was pledged by Mr. Bulu Imam a life member. Mr. Vikramjeet Singh of Bulandshahar also a life member also promised his contribution.

The Members of Executive and Office Bearers of the Society were also elected in the AGM. The names/Designations are as under:

- Patrons:
- (i) Mr. Ravi Singh CEO & Secretary General WWF-India
 - (ii) Managing Director Uttarakhand Forest Development Corporation, Dehradun.
 - (iii) Director Uttarakhand Council of Science and Technology, Dehradun.
1. President – Mr. A.S. Negi IFS (Rtd.) 300 Model Colony, Argaghar, Dehradun.
 2. Executive Vice President – Mr. Rajeev Mehta, Chitra Cinema, Haridwar.
 3. Vice President – Mr. S.K. Banerjee, 53 Inder Road, Dalanwala, Dehradun 0135-2677747.
 4. Ex. Officio Vice President Eastern Zone-CWLW Assam.
 5. Ex. Officio Vice President Southern Zone-CWLC Tamil Nadu
 6. Ex. officio Vice President Western Zone-CWLW Rajasthan
 7. Ex. officio Vice President Northern Zone-CWLC Madhya Pradesh.
 8. Hony. Secretary – Mr. I.S. Negi, 16 Sewak Ashram Road, Dehradun.

9. Hony. Treasurer – Mr. S.P., Singh, Sewak Ashram Road, Dehradun.
10. Lady Member – Ms. Sumitra Rath, C/o Mr. Kanishk Rath, Friends Colony, Cuttack, Orissa.
11. Lady Member – Ms. Reema Pandey, 25 Malviya Road, Laxman Chowk, Dehradun.
12. Member – Prof. J.S. Bali, 215/6 Rajpur Road, Dehradun.
13. Member – Dr. Prashant Singh, 14 Municipal Road, Dalanwala, Dehradun.
14. Member – Mansoor Mazhar, Muradabad, U.P.
15. Member – Mr. Pankaj Shah, 178 B, Panditwari, Dehradun.
16. Member – Mr. R.D. Sharma, 11 Arvind Marg, Dehradun.
17. Member – G.N. Behl, 122/2 Rajendra Nagar, Street-4, Dehradun.
18. Member – Upendra Arora, Natraj Publishers, 17-Rajpur Road, Dehradun.
19. Ex officio Member – Director Wildlife Institute of India, Dehradun.
20. Ex officio – Addl. DG Wildlife MOEF Govt. of India
21. Ex officio – PCCF Uttarakhand
22. Ex officio – Chief Wildlife Warden, Uttarakhand
23. Ex officio – Distt. Magistrate, Dehradun.
24. Ex officio – SSP Dehradun.
25. Ex officio – Director Rajaji NP Dehradun

Membership Fee of WPSI Revised

In the Annual General Meeting held on 18.04.2010, the membership fee of various categories of members of WPSI was revised as under:-

Category of Member

Annual Member

Life Member

Institutional Member (Annual)

Life Institutional Member

Students Member

Foreign Member

Membership Fee

Rs. 400/- per annum

Rs. 4000/-

Rs. 500/- per annum

Rs. 5000/-

Rs. 200/-

US \$ 80/-

Soil Conservation Society of India becomes life member of WPSI

During the quarter soil Conservation Society of India New Delhi, became the life member of WPSI. This was because of keen interest taken by Prof. J.S. Bali, a Veteran Life member, actively associated with the wellbeing of WPSI. As a result of a letter circulated by Principal Chief Conservator of Forests Uttarakhand, Chief Conservator of Forests (Eco-Tourism) Uttarakhand and 3 Divisional Forest Officers also took up life membership of the Society. The following members enrolled themselves with the Society. The new members are Welcome and it is hoped that their contribution to the Society will go a long way in strengthening it.

1. Soil Conservation Society of India, Societies Block - Life Member
MASC Campus, Dev Prakash, Shastri Marg
PUSA Campus, New Delhi-110012.
2. Southern Regional Station, Zoological Survey of India - Institutional Life Member
130, Santhome High Road, Chennai-600028,

Tamil Nadu Annual Institutional Member.

3. Sri Subir Chowfin, C/o Sri A.S. Negi IFS (Rtd.)
300 Model Colony, Araghar, Dehradun-248001
Uttarakhand - Annual Member
4. Muzaffar Ahmad Warsi,
PHD. Scholar, R.O/P.O. Shangar
khanpure, Tehsil Shangar
Distt. Anant Nag, Jammu & ashmir-192201 - Student Member
5. Khursheed Ahmad Sheik,
P.H.D. Scholar (Wildlife)
Village Chakoora, Distt. Pulwama
Jammu & Kashmir-192305 - Student Member
6. Bhavna Sharma, Research Scholar
C/o Mr. Hari Om Sharma,
Canal Road, Ballupur
Dehradun-248001. - Student Member
7. Chief Conservator of Forest, Eco-Tourism, Uttarakhand -
29/6, Pritam Road, Dehradun Institutional
Life Member
8. Divisional Forest Officer
Hardwar Forest Division, Hardwar. Institutional
Life Member
9. Divisional Forest Division, Soil Conservation
Forest Division Ranikhet, Almora Institutional
Life Member
10. Divisional Forest Officer, Civil & Soyam Forest Division
Pauri Garhwal Institutional
Life Member
11. Himalayan Hideaway, Village Kalthari, Post Office
Shivpuri via Rishikesh Distt. Tehri Garhwal. Institutional
Life Member



महामहिम राज्यपाल उत्तराखण्ड द्वारा डा० शिवप्रसाद, आजीवन सदस्य, भारतीय वन्यजीव प्रतिरक्षण सोसाइटी के लेख की प्रशंसा।

डा० शिव प्रसाद भारतीय वन अनुसंधान संस्थान से वैज्ञानिक एस०डी० के पद से सेवा निवृत्त हुए, वे भारतीय वन्य जीव प्रतिरक्षण सोसाइटी, देहरादून के आजीवन सदस्य हैं। उन्हें वैज्ञानिक हिन्दी लेखों के लिए अखिल भारतीय वानिकी साहित्य पुरस्कार योजना के अन्तर्गत नकद पुरस्कार व प्रशस्ति पत्रों द्वारा सम्मानित किया गया है। डा० शिव प्रसाद का "चीतल" त्रैमासिक पत्रिका में "कालीदास के काव्यों में कीट विज्ञान" शीर्षक से एक लेख प्रकाशित हुआ है, उक्त

लेख की तत्कालीन महामहिम राज्यपाल उत्तराखण्ड द्वारा पत्र दि० 16.10.07 से प्रशंसा की गई और निम्न टिप्पणी के साथ अपनी शुभकामनाएँ उन्हें भेजी गई।

“मुझे आशा है कि आपकी इस रचना से वैज्ञानिक जगत में एक नई वैचारिक क्रांति आएगी और यह रचना वैज्ञानिक जगत में अत्यधिक उपयोगी सिद्ध होगी।”

Rhododendrons losing ground

14 species native to Himalayas are critically endangered.

ARUNA P SHARMA

Himalayan rhododendrons are flourishing in western countries where they were popularized by plant explores who visited India and China in the 19th and 20th Century. But the tree genus, marked for its beautiful flowers, is disappearing from its natural habitat due to logging for fuel and development projects like dams.

Nearly 43 out of the 90 odd species of rhododendrons found in India are endangered. Rhododendron experts from India, China and Nepal who met in Delhi last month for a workshop short-listed 14 species that are critically endangered (see box below). Most of them are concentrated in the eastern Himalayas, in Arunachal Pradesh and Sikkim in particular.

An action plan is needed to prevent this.

Endangered List
Rhododendron ciliatum
R. moulmainense
R. pendulum
R. zizelum
R. niveum
R. themansi var candelabrum
R. sikkimense
R. maddenii
R. giffithianum
R. santapui
R. arunachalense
R. coxianum
R. johnstoneanum
R. subansiriense

Courtesy : Down to earth Dec. 1-15, 2007

New vistas in Teri's glacier research

TERI's (The Energy and Resources Institute) Glacier Research Programme took another leap forward with the installation of the Automatic Weather Station at an altitude of 3925m in its Kolahol Glacier Monitoring Observatory at Jammu and Kashmir. This station is equipped with all the sensors necessary to quantify the amount of atmospheric energy being transferred to the glacier system and leading to its negative mass balance. Recently, TERI's team visited the glacier and catalogued various parameters reflecting the changes in its mass balance since last year.

The team has also installed a water level recorder at the lidarvat Discharge Station, taken the glacier profile by using DGPS (Differential Global Positioning System), and has made snow density measurements in the accumulation pits dug at a height of 4600m. The team has also succeeded in

conducting preliminary estimation of black carbon concentration at the glaciated zones of Western Himalaya.

TERI's Kolahol Glacier Monitoring Observatory has the distinction of being an exclusive observatory in Western Himalaya for being equipped with minimum basic infrastructure required for high precision scientific glacier research.

TERI has also joined hands with IMF (Indian Mountaineering Foundation) and signed a MOU (Memorandum of Understanding) to study, preserve and safeguard the Himalayan glacier under the NAPCC (National Mission of Sustaining the Himalayan Ecosystem).

Stressing on the need to study the Himalayan belt, Dr. R.K. Pachauri, Director General of TERI, said, 'We wish to study more on glaciers as we are very dependent on them and our work till now has been negligible. We need to understand the drivers and implications of the changes happening in the Himalayan belt.'

Courtesy Terra Green, Vol 2, Issue 8, Nov. 09

Struggle for Survival

Vijay Pinjarkar, TNN 16 November 2009, 01:20 am IST NAGPUR: A full-grown sambar is chased by two tigers. It tries to save its life by entering the shallow waters of a lake, where it is stalked and attacked by a crocodile. The sambar successfully staves off both attackers for 24 hours before, struggling from exhaustion, it falls prey to the tigers the next morning.

This stunning natural drama, like the 'Battle at Kruger' at Kruger National Park in Johannesburg, South Africa, in 2004 between a herd of Cape Buffalo, a small pride of lions, and two crocodiles, was witnessed by the 18 participants of an international course and some tourists on Friday at the Tadoba-Andhari Tiger Reserve (TATR). The international course, 'Education as a tool for species conservation', was focusing on tigers in India and has participants from Thailand, Nepal, Bangladesh and India.

The participants reached Telia lake in TATR's Moharli range during their field round at 6.45am. They first saw a full-grown sambar stag returning after quenching its thirst. A tigress was hiding in the tall grass, waiting for the sambar to come close and started approaching it off a forest trail. Sensing trouble, the sambar turned and saw the tigress right in front. The sambar took off to save its life with the tigress giving hot chase. Seeing no other option, the sambar chose to enter the Telia waters. The tigress had to stop the chase after the sambar entered the waters. But this was not the end of the sambar's troubles. There were two crocodiles in the lake and they approached the sambar. The tigress had by then positioned herself at the western end of the lake. The sambar kept running around in the shallow waters as it tried to dodge the crocodiles for well over half-an-hour. The sambar had raised an alarm, but unfortunately for it, another Tigress in a nearby compartment heard these calls and came rushing to the lake from the southern side.

It positioned herself in the tall grass towards the south, making the situation tougher for the sambar. At around 8.30am, the Sambar decided to come out of water and try to escape. It had walked barely 50 metres to reach the tall grass when the first tigress attacked from the west and the second tigress also made an attempt from the south. However, the sambar luckily escaped attacks and returned to the waters with a little injury on its hind legs.

No sooner did the sambar enter the waters, the crocodiles started approaching it again. Both the tigresses also resumed their original positions in the wait for the sambar. The animal was by now struggling a bit due to its injury and blood loss. At 10.30 a.m. the sambar was literally limping when it made a third attempt to escape. The participants waited with bated breath as they thought this would be the last bid by the sambar to save its life. The moment the sambar left the water and

reached the grass with great pains, the first tigress again charged the animal. to the surprise of everyone present, the sambar survived the third attack too and returned to the waters.

As the tourists were running out of time, they left the park. As soon as the after noon round of TATR started at 2 p.m., everybody rushed to check out the final outcome of the battle. To their surprise, the brave sambar was still in the water! They again checked at 5.30 p.m. before leaving the reserve and to their surprise the sambar was still in the water. The crocodiles had by then apparently given up on the sambar, however the tigresses were still waiting for the kill. some photographers, who waited for hours to see the end of the spectacle, said that the sambar attempted to escape a few more times. On Saturday, November 14, when the participants reached Telia lake at 6.30 a.m. they saw the sambar had been finally grounded by the first tigress on the bank of the lake. The brave sambar seems to have lost the battle between life and death after resisting for almost 24 hours.

Courtsey : Times of India 16th Nov.2009(Sent by Subir Chawtin)

Wash Carbon footprint away

Washing clothes, a daily routine in every household, can hold the key to reducing our carbon footprint, simply by the choices one makes when buying detergent or a washing machine. Dr. S. Majumdar, senior counsellor at CII-ITC Centre of Excellence for Sustainable Development, an institution that helps business pursue sustainability goals, advises consumers to buy machines that use less water and energy because even "though one might have to shell out Rs. 2,000-3,000 more, it will still be a saving".

Reducing the temperature at which we wash clothes can mean reducing carbon dioxide emissions between 1 and 10%, according to a Proctor and Gamble Survey. Using liquid detergent can mean saving anything between 4 and 9% carbon dioxide. Detergents with enzymes are best for the planet because they mean reduced water and energy consumption. An average washing machine consumes 45-49 litres of water in each cycle.

A shorter cycle could save up to 10 litres of water with every wash. So what are these magic enzymes in the most desirable detergent? They are proteins made of amino-acids and work on clothes the same way as they work in the digestive system – by breaking down fats. they break down large, water-insoluble fabric stains into smaller, water-soluble pieces. These are removed by the washing machine's actions or by interaction with other detergent ingredients. They work at low temperatures and are biodegradable.

Different enzymes work in different ways. Cellulase, for instance, prevents fuzz from forming on the surface, leaving clothes clean and bright. Proteases act on stains containing proteins, such as those found on the collar and cuff, while amylases remove starch-based stains, e.g. sauces and gravy. They help save energy – a washing machine operated at 40°C, which is the ideal temperature for enzymes to work, consumes only one-third the energy it would use at 95°C.

These enzymes act as catalysts, speeding up chemical reaction and can replace conventional chemicals in the detergent. A minimal amount of energy is needed to produce enzymes but when compared to the energy saved by washing at 30°C, carbon emissions are reduced by 100% per wash.

As for washing machines, Majumdar advises looking at their star rating before buying. Their energy efficiency ranges from one to five, five being most efficient. Washing machines account for some 22% of the average household's water consumption, so it makes sense for all of us to go for the most carbon-friendly.

Source : Times of India, New Delhi, Nov. 29, 2009

Shark Tale

A New Study, examining the status of 64 species of pelagic shark and ray species, reveals that 32% are threatened with extinction. Sonja Fordham, deputy chair, IUCN shark specialist group, speaks to Tirna Ray.

The International Union for Conservation of nature (IUCN) Shark Specialist Group (SSG) is in the final stages of assessing all of the world's sharks and rays—roughly 1,100 species. The analyses for the recent IUCN pelagic shark report began at a 2007 workshop in Oxford, where experts evaluated the status of a subset of the most oceanic of the pelagic sharks. The results of that workshop were published in a scientific paper, which formed the basis for the recent report, informs Sonja Fordham, deputy chair, IUCN Shark Specialist Group.

As to the major findings of the study, experts examined the status of 64 species of pelagic shark and ray species against the IUCN Red List criteria and concluded that 32% meet the criteria for 'critically endangered', 'endangered' or 'vulnerable' 24% classify as 'near threatened'. Besides the percentage of pelagic shark and ray species threatened with extinction is higher for the sharks taken in high-seas fisheries (52%) than for the group as a whole.

In addition, the report offers details about the conservation status of sharks. While sharks are susceptible to over fishing because they typically grow slowly, mature late and produce 'few young', they are also increasingly targeted for meat and a high demand for the Asian delicacy shark fin soup. According to the report, fins are often cut off sharks while the rest of the body is discarded at sea through a process known as 'finning'. The findings further reveal that though finning has been banned in most international waters, enforcement standards are lenient – the EU finning ban being among the weakest in the world. In addition, there are no EU limits on catch of hammerheads, makos, threshers, oceanic whitetips or blue sharks.

Talking about hammerhead sharks and giant devil rays, which are globally endangered, Fordham explains, "Hammerhead sharks generally do not enjoy a high level of public concern—perhaps because of misperceptions about the danger they pose to people – and as a result, have not been a high priority for species-specific conservation action. Hammerheads are preferred specific for the shark fin market and yet their meat is not considered of high value; as a result, these species often fall victim to finning."

Giant devil rays, Fordham adds, are arguably more charismatic and enjoy more public support than hammerheads and are generally not targeted by fishermen. Their main problem is incidental take (or by catch) in fishing gear. Their restricted range (mainly the Mediterranean), small number of pups (one or two per-year), lack of awareness about their poor status, and low priority for research into their lifecycle exacerbate the threat.

India currently ranks second in the world for shark catches (nearly 78,000 metric tonnes reported in 2005). India was instrumental in securing international trade restrictions for whale sharks, but shark fisheries management in India is lacking. There is ample opportunity for India to become a regional leader in shark conservation, but such an initiative will require greater support from the public and policymakers", says Fordham.

Source: Education Times, Nov 23, 2009

At climate meet, US came with little, went back victorious

Copenhagen, There was only one victor at Copenhagen – the US. And there was one loser at the end of fortnight-long talks – the agenda to prevent dangerous climate change. The others,

including the powerful set of four emerging economies – China, Brazil, India and South Africa – at best, saved their political faces. For now, on Saturday, most of them were packing their way back to their respective capitals with their hopes for even an ambitious political deal (forget a comprehensive pact) to prevent further global warming postponed to 2010.

As the talks on the Copenhagen Accord and the two tracks of negotiation continued into the extra day on Saturday, it became evident that Barack Obama had come with little, got the other developed countries to play along, put the developing world under immense pressure, and has gone back extracting commitments that would help him muster the support of his Senators and Congressmen for his domestic climate change bill.

The three page document-built on the pledge and review formula it has for a year promoted in the face of opposition from developing countries-became yet another evidence emerging from the climate change negotiations that the US could still 'convince' the most powerful set of countries across continents to sit together and 'mellow'. The feat defied the estimate that its preoccupation with two wars and an enfeebled economy would prevent the US from having its way. When some beyond the chosen countries, such as Bolivia and others, protested on Saturday against the accord, US went to the limit of claiming that the text of the accord could not be changed by negotiators of other countries, it had to be accepted as it was.

In the run-up to Copenhagen, US had been pilloried for offering nothing to the rest of the world to prevent climate change-finance, technology or its own substantial emission reduction cuts.

Source : The Times of India, Dec. 21, 2009

Is climate change for real?

The hard talk is on at Copenhagen. In the huddle are negotiators from more than 192 nations, trying to forge a common plan to save the planet. Beyond the hope, hype and bickering about who pays how much to whom, lies a plain fact-there's near-total consensus among governments of the world that fossil fuel emissions have been leading to a critical rise in atmospheric greenhouse gases, which in turn is causing global temperatures to rise and changing the Earth's climate patterns. Ironically, this consensus totally breaks down when civil society begins to talk about climate change. Governments of the world are convinced about the warming effects of greenhouse emissions, but are the people? Is the science of global warming settled? During the course of a climate change fellowship attended in the US last month, leading climatologists spoke on the subject. The insights we got were both revealing and troubling. To answer the second question first – yes, the science behind what's causing the Earth to heat up seems pretty settled. A few notable dissenters aside a majority of climatologists believe there's strong evidence to show that fossil fuels are causing the warming. The study of climate change is a multi-disciplinary system science. Like any science of this nature, there are things that are well established and areas which aren't that is, where competing explanations exist – and some parts that are yet speculative. Understanding is built and unbuilt through accumulated evidence over decades.

As Stephen Schneider, professor for Interdisciplinary Environmental Studies at Stanford University and a pre-eminent climate change expert put it, understanding climate is like understanding the world economy: it's never solved by one new piece of information. And the answers are never in plain yes or no, but in degrees of certainty.

For instance, to understand whether human activity was leading to a rise in global temperatures, scientists had to build climate models based on observed data and make predictions. These models predict an overall warming trend. Temperature data of the last 100 years, and the last 50 years, bear this out. Since there are two possible outcomes in the data set-warming or cooling-there's a 50 per cent chance that this prediction was random. There's more. The models also predict

that middle of the continents warm up more than middle of oceans. Again, observations show that; the case. Models predict stratosphere cools, lower atmosphere warms. Right again. Models predict the stratosphere cools because of ozone depleting substances and relative damping. They also predict that there's more warming at night than the day. Yet again, the models get it right. Put together, these models leave a statistical possibility of just 5 per cent that all these correct predictions were arrived at by pure chance. In other words, the statement that humans, through fossil fuel emissions, are warming up the planet has a scientific accuracy of around 95 per cent. That's a very high degree of certainty. No other competing explanation of the observed data-natural cycle or solar activity-comes anywhere close to the robustness of this theory.

To return to the first question – why are so many people not convinced? there are strong vested interests in letting people believe that warming is a myth. It's no surprise that a lot of climate change deniers get funds from multinational oil conglomerates. The second reason is the way the science works and the way scientists communicate it. Climate science is all about probabilities, not certainties. And scientists are careful about throwing in all the caveats while making their points. On the other hand, people who are cherry-picking definitive. No guessing which set of speakers would leave a more lasting impression on prime-time TV.

Source : The Times of India, Dec. 15, 2009

Nasa mission to unravel Sun's threat to Earth

New Probe could Help Scientists Predict Destructive Solar Storms

Nasa is to embark on one of its most ambitious missions in an attempt to unlock the secrets of the sun.

Following its launch in nine days' time, the US space agency's Solar Dynamics Observatory (SDO) will spend five years in orbit trying to discover the causes of extreme solar activity, such as sun spots and solar winds and flares.

Scientists have long been aware that disturbances on the sun can trigger dangerous x-rays, charged particles and magnetic fields that can disrupt power supplies, communication signals and aircraft navigation systems of Earth.

By understanding how such solar phenomena are created, they hope to be able to produce reliable forecasts of "space weather: and warn of any threat well in advance.

Orbiting the Earth at a distance of 22,300 miles, the observatory will measure fluctuations in the sun's ultraviolet output, map magnetic fields and photograph its surface and atmosphere.

Experts have likened the mission to a "giant microscope" that will capture for the first time every nuance of the sun's exterior. The images relayed to Earth will be 10 times clearer than high definition television.

Solar magnetic storms and space weather disturbance have had a number of dramatic consequences over the years.

In 1989, millions in Canada and the US were left without electricity for over nine hours after a magnetic storm sent shockwaves through a power grid. Five years later, a geomagnetic storm temporarily knocked out two Canadian satellites and international communications satellite Intelsat-K.

The most power solar storm in history, called a "superstorm", occurred in 1859. It caused telegraph systems in Europe and North America to fail.

Source : The Times of India, Feb. 2, 2010

Save earth from human nature

The ever evolving definition of hell needs a Delhi update. Hell is being trapped in a steel tube ensnared in the evil fog of an airport tarmac. Hell is helplessness as deceptive nature winks through the seeming window in a darkness flecked by swirling waves of heavy, oppressive air and then shuts it with an impenetrable, dense grey screen as your aeroplane begins to taxi optimistically towards opportunity. Where the hell has global warming gone?

Should it be considered entirely appropriate, or wickedly fortuitous, that the world has witnessed its coldest winter in a long while just after the much-vaunted gathering of the high, low, mighty and weak at the Copenhagen conference on global warming? The conference itself produce molehill of unimplementable phrases out of mountain of hype; the charter could not tie China to Togo or America to Tong despite the presence of extraordinary collection of worthies who tried their level best to disguise their failure behind the fanfare of promotion. The dramatics started much before the meet: the Maldives held a Cabinet meeting on its oceanbed and Nepal on Mount Everest. Not to be outdone, our own acrobatic and hirsute minister for environment, Jairam Ramesh, flipped a break taking triple somersault. But no resolution was actually adopted by the 192 nations present and five countries would not even design to pretend they agreed. No one gave any commitment on reduction of carbon emissions that could be held to account because it was not required. Big boys sniffed at the kids, who hollered for more pocket money. China would not even permit nations like Germany, who had come with commitments, to record their percentages lest it become a precedent that it would be compelled to follow. In the classic manner of those who have little to offer, it sought, and got, agreement to talk another time, as if conference in Delhi was going to even be the success that Copenhagen had been unable to deliver. The reasons was never stated, but is now becoming apparent: there is a growing suspicion that climate theology has been constructed out of shaky testament.

Hypocrisy might be the least of our travails by the time details fully unravel. We might be starting at a PR process over the last few years during which bombast and academic fraud with multiple epicentres, one of them Delhi, has been richly rewarded with grants, respectability and what used to be the highest of accolades, the Nobel Prize for Peace.

What is the difference between a band and a bandwagon? the first turns into the second when a trumpets begin to play false notes, and the world applauds it as revolutionary music. The 2007 Nobel Peace Prize was won jointly by Al Gore, father of climate change, and a United Nations body, the Intergovernmental Panel on Climate Change. The latter created a worldwide brouhaha by announcing that it was 'most likely' that Himalayan glaciers were in retreat and would disappear by 2035. It was the perfect horizon: too far for anyone making the prediction to be alive in that year, and close enough to frighten the wits out of alarmists. 'Most likely' means, in such parlance, a 95% probability. The evidence for such a dramatic conclusion came, it now transpires, from a single interview given by an Indian glacier specialist (a former vice-chancellor of universities now working for the government of Sikkim) 10 years ago to the New Scientist. TERI gave him a reasonably comfortable retirement benefit at its comfortable Delhi premises and its director, now in his avatar as Cardinal Green of Pope Gore, went on to share the limelight in Oslo. The scientist was comforted by a Padma Shri – not bad, but not quite a Nobel Prize. The New York Times has now reported that this scientist (let us leave him nameless) claims he was 'misquoted' in that original interview. As misquotes go, this must surely be the most glistening jewel in the baggage train of a bandwagon.

No one stops a roll on its way to reward, so we should not be too surprised that this particular scientist did not notice he had been misquoted while the Nobel was being doled out. What is astonishing is the absence of any due diligence by the Nobel committee. Sceptics have suggested that the Peace award to US president Barack Obama was egg on Oslo's face; well, this was a whole hatchery.

May be Nobel has imply run out of candidates for the Peace Prize. Peace is not the favourite pastime of our times, and is too relative. Nobel should rename the award; Sanctimonious Prize? Brand Value Prize? Holy Cow Prize?

The dark fog of nature can never compete with the oily smog of human nature.

Source : *The Sunday times of India*, Jan. 24, 2010

March of the Penguins

The emperor is the giant of the penguin world and lone of the largest of all birds. It is the only penguin species to breed through the cold, dark winter, with temperatures as low as -50°C and winds of up to 200 km per-hour. If, so far, there has been a paucity of information on the number and distribution of emperor penguin colonies, it could be attributed to their habit of breeding on sea-ice during the Antarctic winter. Access by researchers is difficult during these winter months. And by the time people have access to the colony locations during the summer, the penguins have already left their breeding grounds for the open ocean.

But a discovery by mapping expert, Peter Fretwell, at British Antarctic Survey (BAS), UK, reveals that satellite images of Antarctica can be used to locate emperor penguin breeding colonies. Explains Fretwell, "This can be done by identifying guano (excrement of sea birds) stains on the ice. We can't see actual penguins on the satellite images because the resolution isn't good enough. But during the breeding season the birds stay at a colony for eight months. The ice gets dirty and its the guano stains that we can see from space."

A part of the study, BAS scientists used satellite images to survey the sea-ice around 90% of Antarctica's coast. The survey identified a total Antarctica's coast. The survey identified a total of 38 emperor penguin colonies. Ten of those were new. Of the previously known colonies, six had relocated and six were not found. This research builds on the work by French scientists who extensively studied one colony and found that the population was at a significant risk due to climate change. The six colonies-not found in this study – were at similar latitude suggesting that emperor penguins at lower latitudes may be at risk all around Antarctica. Fretwell adds, "To confirm that what we were seeing were penguins, we recently sent an airborne reconnaissance mission to fly over one of the newly-found colonies at Clarke Bay at the base of the Antarctic Peninsula. The photos from this survey have confirmed that the reddish brown stains really are penguin colonies."

For this project, Fretwell worked with penguin ecologist Phil Trathan. They are now proposing further studies by BAS to carry out additional aerial surveys and to assess the global population of this 'charismatic' species.

Recent computer modelling studies (based on over 40 years of population data in Terre Adelie in the Antarctic) have predicted that populations have a high probability of declining by 95% or more in the face of climate change. These predictions are based on one colony, located relatively far north at 66.6° south. The new methods developed by Fretwell and Trathan make it possible to test these predictions at other locations where emperor penguins breed, particularly further south where the majority of emperor penguin colonies occur.

This method of identifying emperor penguin breeding colonies has helped British Scientists provide a baseline for monitoring their response to environmental change. Now they know exactly where the penguins are. "The next step will be to count each colony so that we can get a much better picture of population size," adds Fretwell.

Education Times, Feb. 1, 2010

On Thin Ice

A 'Himalayan blunder' has muddled the climate change debate further. The causality could be the planet.

In the first scene of Stephen Gaghan's *Syriana*, a missile is stolen by a shady character in Tehran. Then the movie traverses through the murky world on Texan oilmen, Middle East depots, rogue CIA agents, crazed terrorists, Washington investigators, energy analysts and poor migrant workers in the Gulf. In the end, a Pakistani lad blows up an oil rig with the missile mounted on his boat, and the six parallel narratives in the film collapse into one single fact: in the age of globalization, everything is connected. Now, with Osama bin Laden quoting Noam Chomsky to slam the American policies on climate, it's apparent that everyone, including the world's most wanted man, has something at stake in his raging debate Gaghan was right. Everything connected.

An media reports in the West expose more and more "flaws" in the Intergovernmental Panel on Climate Change (IPCC) report, the global warming debate has begun to look like the plot of *Syriana*, with all major players – fossil fuel firms, rich governments, poor governments, advocacy groups, scientists and carbon-credit companies – trying to give their own spin to the narrative. It raises a lot of questions. Who is twisting the facts? Who-benefits from global warming? Who benefits if climate change is a hoax? Who is going to make money with new green technology? Are the glaciers really melting?

It's no coincidence that the attacks on the IPCC began to intensify as the January 31 deadline set at Copenhagen for countries to submit their pledges on emission reduction targets came close. Some experts even see a conspiracy here. "I think the charges against IPCC are part of a long-running campaign to try to discredit climate science by any means possible," says George Monbiot, a respected British columnist on environmental affairs.

While climate sceptics have done their best to prove that global warming is nothing but a hoax, the advocates of green policies fear that the anti-IPCC campaign may derail the entire process. "Discrediting the IPCC would weaken the case for accepting the Copenhagen accord, not strengthen it. The IPCC has been subject to hostile scrutiny since its inception in 1988, principally from industries who fear that a shift to a clean economy would undermine their profits," says Vivek Sharma of Greenpeace India.

Notwithstanding Sharma's spirited defence of IPCC, the fact is that the world body did goof up, particularly on its predictions about the future of the Himalayan glaciers and the Amazon rainforests. It's a crucial mistake considering IPCC's main job is to assess existing scientific studies on global warming. Though only a couple of pages out of the 1650, page report have been disputed, there may be more dirt in store for the panel as the debate gets shriller.

Rajendra K Pachauri, the IPCC chief who received the Nobel Peace Prize on behalf of the panel in 2007, blames powerful lobbyists for the "campaign". There are some vested interests in the rich countries who are currently overactive. The Centre for Public Integrity in Washington said in a report in 2009 that more than 770 companies and interest groups had hired an estimated 2,340 lobbyists to influence federal policies on climate change. It also stated there is a reason to fear that climate policy will die at the hands of special interests. These are active in other countries as well," he says.

These special interest groups might be working overtime in Washington, but it's actually the governments of rich, emerging economies have strong differences with the developed world on the Copenhagen accord. "It's a political declaration and not a legal document," says Jairam Ramesh, adding that India wants the action groups on the Kyoto Protocol and Bali Action Plan to continue their work in the run-up to the next summit in Mexico in November this year.

The other bone of contention could be the \$10 billion the rich countries have promised to the least developed nations. "We want them to keep their promise. Even we are giving free technology to our neighbours" says Carlos Minc, Brazil's environment minister. But the developed world, still recovering from the financial crisis, may not be in hurry to comply.

Experts fear all these controversies may end up sabotaging a possible climate treaty. "The key is to try to get a legally binding treaty, securing no more than a two-degree rise in temperature. The problem is we are working in the wrong framework," says Monbiot. "It's not likely to improve the situation."

With the al-Qaida chief also jumping into the debate, the situation can only become worse.

Source : Sunday Times of India, Jan. 31, 2010

Trickle of hope in the parched Himalayas

An innovative effort led by Barc shows how springs can be recharged to solve the water shortage at the world's Third Pole.

Pokhri: It's a sparkling morning, the dawn chill lifting as the sun's rays light up this little village in Pauri Garhwal. Situated nearly on top of a hill, and facing east, the villagers get the early sun. It helps, because morning is the time for fetching water from the three public taps in this small village of 235 people. Each family gets two buckets, no more, and then the tap is put under lock and key, using an ingenious contraption made from a metal dabba.

This is a fairly common story in the parched Hilamalyas, often called the "Water Tower" or even the Third Pole of the world, because these mountains contain the largest store of freshwater in the world after the north and south poles. Most of it is in the form of snow and glaciers. Life-giving waters of 10 major river systems originate from the Himalayas, sustaining nearly one-fifth of humanity from southern China, through the Mekong delta in Vietnam and the Irrawady in Myanmar to the Indo-Gangetic plains.

But for the people here, water is arguably the greatest hardship. Spring water, the main source of water in the hills, is drying up. In Pokhri, it trickles in at about 11 litres per minute, while the need of the villagers – for personal use, as well as for animals and kitchen gardens-will get fulfilled only by 24 litres per minute. And, this is leaving aside irrigation needs.

With changes in rainfall pattern, deforestation and growing population, the springs are going dry across the hills. This has unleashed many responses, ranging from government schemes to lay pipelines to more lasting efforts by NGOs at rejuvenating water sources.

One of the most innovative efforts is the result of an unlikely collaboration between villagers of Nagrasu, in Rudraprayag district, and nuclear scientists of BARC. Using isotope analysis, the scientists traced water flows inside the mountain. This helped locate the areas from where water starts percolating into the ground to finally reappear at the spring. Water conservation structures were built on these areas so that the water doesn't flow off but gets absorbed into the ground.

Gursharan Singh, head of Bare's isotope division explained the process to TOI. "Naturally occurring isotopes of oxygen and hydrogen were analysed from water collected at various points above the spring by the scientists. Through this, and by studying rock structures, we determine the exact path of water-flows. Then our experts can suggest methods of holding the water there through check bunds, ponds. etc. It takes about 3 years for the whole process," he said.

Source : The Times of India, Dec. 2, 2009

Climate talks: Win-win situation for India?

Copenhagen: India and 25 other countries agreed to the Copenhagen Accord even as the other developing countries accepted it as fait accompli later. Even for India though, the Accord came out of hard bargaining lasting almost 20 hours among heads of governments of some of the most influential countries in the world. At the end of the day on Saturday, when the battle was over; India appeared to have ceded ground on some issues but blocked intrusion on other redlines.

It had become evident within the first week of the talks that the best even the four emerging and powerful economies of the developing world-China, India, Brazil and South Africa-were going to do, or willing to do, was to defend the existing economic resource sharing regimes.

Demanding an ambitious climate change deal the required deep emission reduction commitments, financial or technology transfer obligations from the rich countries would have put the emerging countries in direct conflict with the recalcitrant industrialized powers but got a better pact for the poorest nations of Africa, the small island states and the least developed countries. But with stakes too high and the rich countries making abjectly clear that they were not playing to the rules but to change the rules altogether, the four emerging economies decided to instead scratch up a low-ambition deal-a pact that would lower the pressure on them by lowering the demands off the rich countries in parallel.

Incidents and episodes in the lead up to talks-such as all the four emerging economies taking on 'domestic and voluntary emission intensity reduction targets' almost in unison while the US and other rich countries suggested a formula of internationalisation of these targets-lent themselves to be easily interpreted as an alliance of minds between Washington Beijing, Delhi, Brasilia and Pretoria.

The US suggested that all countries should take domestic actions as they like and then pledge them together in an international accord and have a common level of international accord and have a common level of international scrutiny of their work on mitigation.

Finally the Copenhagen Accord struck on Friday night did take a morphed form of the US-backed schedules approach of 'pledge and review'.

Source : The Times of India, Dec. 21, 2009

100 सालों में 0.5⁰ बढ़ा तापमान

नई दिल्ली — ग्रीन हाउस गैसों का उत्सर्जन 70 फीसदी बढ़ने के कारण वर्ष 1970 से 2004 के बीच भूमंडलीय तापमान में काफी वृद्धि हुई है। 100 वर्ष में विश्व का तापमान 0.74 डिग्री और भारत का तापमान 0.5 डिग्री सेल्सियस बढ़ा है। पिछले 12 में से 11 साल वर्ष 1850 के बाद से दुनिया के सबसे गर्म साल रहे हैं।

पृथ्वी विज्ञान मंत्रालय की सोमवार को 'जलवायु परिवर्तन का समाज पर प्रभाव' विषय पर आयोजित संगोष्ठी में वैज्ञानिकों ने यह निष्कर्ष पेश किए हैं। विज्ञान और प्रौद्योगिकी विभाग के सलाहकार डा0 अखिलेश गुप्ता ने शोध पत्र में कहा, 'बीते 100 वर्ष में दुनिया का तापमान 0.74 डिग्री और भारत का तापमान 0.5 डिग्री बढ़ा है। उन्होंने कहा कि भूमंडलीय तापमान में वृद्धि से पहले कार्बन डाई ऑक्साइड की वायुमंडल में मात्रा 280 भाग प्रति मिलियन थी जो अब बढ़कर 380 भाग प्रति मिलियन तक पहुंच चुकी है।

भोपाल स्थित मौसम केन्द्र के सहायक वैज्ञानिक वहीद खान ने कहा, 'वर्ष 1970 से 2004 के बीच विश्व में ग्रीन हाउस गैसों के उत्सर्जन में 70 फीसदी की बढ़ोत्तरी हुई है। भूमंडलीय तापमान में इजाफा होने का यही कारण है।' उन्होंने आगाह किया कि दुनियाभर में बर्फ का तूफान देखा जा सकता है क्योंकि समुद्र के तापमान में बदलाव हो रहा है।

Source : Amar Uhala, Feb. 9, 2010

Young Reader Section

INSECTS

Finding a Place to Live

Insects have managed to survive in almost every habitat in the world,. Insects seem to be everywhere—swimming in the water, flying in the air, living inside plant stems, boring into wood, inside fruits, under the leaves.....In fact, it is almost impossible to find a place here there are no insects.

You can find insects living on the sea-shore (a type of silverfish that scavenges on the coastal rocks; and seaweed-flies that breed in the rotting seaweed that gets washed on the beach). Even in the inhospitable deserts you may come across locusts, and by evening there could be dung-roller beetles coming out of hiding.

The minute springtails can be found on the surface of sea water as well as on the high mountains in the snow, which gives them the name snow-fleas. The snow apollo butterflies fly on the mighty Himalayas. In damp musty caves one can come across crickets and cockroaches. Insects like the louse flies, fleas and lice get free rides on animals and birds while also feeding on their blood.

The activities in this section will focus on what an insect needs to survive and how an insect's habitat provides for their needs. Here are some concepts that will be reinforced through the activities.

Habitat: An animal's home is called its habitat. And as all animals do, insects live in habitats that provide them with food, shelter, water and space to nest, lay eggs and grow. Each insect has specific environmental needs that ease the competition with other insects. For example, the needs of tent caterpillars are different from the needs of a flea. Tent caterpillars, which eventually turn into moths, survive by eating leaves and weave a silken tent of leaves and silk for protection. Fleas survive by sucking blood from a warm-blooded host. Some insects, such as cockroaches, are very adaptable and can live in many different kind of habitats. Other's such as human lice, that are found in hair, need a very specific type of habitat in order to survive.

Food: the best way to tell what an insect eats in by taking a close look at its mouth. An insect mouth is made up of several parts all working together. Each part is adapted to meet the eating needs of the insect.

The Need for Oxygen: Most insects get the oxygen they need from the air. But they do not have lungs as we humans do. Instead air enters their bodies through tiny openings called spiracles on the sides of the abdomen and thorax. (There is often a pair of spiracles on each segment of the thorax and the abdomen). That is why it is difficult to drown insects with their head down, because the spiracles are located on the sides of the body. The spiracles are connected to a network of tiny tubes, called tracheae. From there oxygen is absorbed by the cells in the insect's body. When the insect exhales, carbon dioxide passes out through the tubes and then out through the spiracles. The opening to the spiracles can be closed by tiny flaps attached to muscles. For larger animals, this is not a very efficient way to breathe. But being so tiny, insects do not need as much oxygen as larger animals require.

Many of the insects that live in water have a very thin exoskeleton that allows dissolved oxygen in the water to seep into their bodies. The oxygen then enters the tracheal system. In aquatic insects like the caddisfly larva there are more than 60 tracheal gills and these, along with the gill plates it has along its body, enable it to breathe in water.

Water scorpions and water stick insects have a breathing tube (that looks like a tail)_ that sticks out of the water to get air, and some insects like the diving beetles renew their air supply by coming to the surface tail-first and carry down lot of air beneath the tips of their hard wings, as

bubbles attached to their hind end. Through this bubble, the diving beetle absorbs oxygen under water.

Shelter: Insects live in places that provide them with shelter from predators, harsh weather, and from drying out. For some insects that means living underground, inside logs, in a plant stem, or on other plant galls, fruits or vegetables. And many insects build their own shellers. For examples, honey bees build hives of wax, and termites build their mounds of mud.

Water: Most insects get the water they need from the food they eat. Others drink water from ponds, streams, puddles or dew drops. For example, on hot days butterflies and bees could be seen gathered around wet mud, probing for moisture.

Living conditions: Each specific habitat provides certain living conditions-temperature, humidity, sunlight, soil, vegetation-that are suitable for the animals that live there. Each habitat supports only those animals adapted to its living condition. For example, cockroaches prefer damp and musty corners that suit their secretive behaviour.



BIRDS

Winter Visitors

Migration is the seasonal, large scale, long distance, two-way, regular movement of birds in a fixed direction. The movement is roughly from north to south in the autumn, and back from south to north in the spring. These journeys are known as autumn and spring migrations respectively. There is another type of migration also. As the autumn advances, the birds of the higher regions of great mountains descend to lower regions, foot-hills or plains, to avoid the harsh winds. The birds then pass the winter there. On the approach of the spring, when the snow melts, they ascend the mountains to return to their original breeding grounds, and stay there till autumn. This descending in autumn and ascending in spring are known as altitudinal migrations. Some of the himalayan birds, e.g. Chestnutbacked Sibia and some species of Yuhinas and Tit-Babblers are altitudinal migrants. The sporadic movements of birds in search of new feeding places in any direction is not migration, though it might involve a journey of several hundred kilometers. It is known as dispersal. Migratory birds come to India from far away countries and regions in the north-west or north-east-right from Germany, extreme Northern and Western Siberia as well as Central Asia, to Ladakh and the Himalayas.

Our migratory birds breed in these areas during the spring and summer. By the time their young ones are fully fledged, autumn sets in. Winter is not far away, and the climate there starts changing. The weather becomes colder, lakes and rivers begin to freeze; availability of food decreases. The time available for foraging is reduced as days become shorter. This is when the birds start migrating to southern countries, in the Indian Subcontinent, and in Africa.

At that time in India, it is the end of the monsoon season. The countryside is green with luxuriant vegetation; fields are full of ripening crops; insects are in abundance everywhere. As a result the food is in plenty and easily available. The birds spend the winter months in this favourable environment.

From February onwards, it is the time for return migration. By then, the heat begins to increase, water bodies start shrinking and drying. Winter crops are harvested, the countryside becomes dry, and insect life decreases as temperatures rise.

Meanwhile, in those countries of the north, from where the migrants had come, days become longer, the snow starts melting, frozen rivers start flowing and lakes become full of water. Plants and crops begin to grow, trees put on fresh leaves and flowers. The land becomes lush green and insect life flourishes. The bleak atmosphere of winter changes totally and becomes once more favourable for breeding and rearing the young ones. It is time for the migrants to return.

Migration is a hazardous journey. Thousands of migrating birds never reach their destination, due to the several obstacles they may encounter along the route. Sudden changes in the weather can upset their flight; strong winds may blow them off course, fog could confuse their sense of direction. They may be attracted by bright lights of airports, or high rise towers, light houses, etc. and may crash into these. They may be shot accidentally, as they fly over war torn zones, or may be hunted or may be affected by polluted air or water. At every stage of the journey, there are dangers for the travellers.

Bird Migration in India

The scientific study and systematic observation of birds has a comparatively recent history in India. Nevertheless, many Indian people have had some rudimentary knowledge of migration, of at least some species of birds. For example, the regular and periodic arrival and departure of such large and systematic fliers as cranes could not remain unnoticed. Skein after skein of cranes rhythmically flopping their wings while flying high up in the sky proclaimed their presence with loud sonorous calls. Ducks also attract attention of the people by their large congregations on waterbodies, where some

months before hardly any ducks were seen. similarly the large seasonal influx of such gregarious birds as Rosy Pastors and Blackheaded, as well as Redheaded, Buntings did not fail to register their presence in the popular memory.

There are nearly 2100 species and sub species of birds in the Indian subcontinent. Of these over 300 are migrants.

The most abundant and common migrants to India are Cranes, Geese, Ducks, Waders, Buntlings, Common Swallows and Rosy Pastors. All these arrive here between September and November and leave from February onwards; some linger upto May or June.

Our migratory birds include:

Ducks – shoveller, Mollard, Wigeon

Geese-Greylag/Barheaded

Birds of prey-Imperial Eagle, Black vulture,

Sparrow-Hawk, Marsh Harrier, Peregrine Falcon.

Cranes-Common Crane, Demoiselle Crane, Siberian Crane

Storks – white Stork, Black Stork

Pelicans – White pelican, Grey Pelican

Waders – Black tailed Godwit, Bartailed Godwit, Curlew, Snipe, Crab Plover, Avocet, Oyster-catcher.

Gulls – Great Blackheade Gull, Herring Gull

Terns – Caspian Tern, Sandwich Tern

Warbler, Orphean warbler, Lesser warbler

White throat warbler

Wagtails – Yellow wagtail, Yellow headed wagtail

Himalayan birds-Stonechat, Grey Drongo, Woodcock

Common Swallow, Rosy Pastor.

Long-distance Migrants

Sanderlings, Grey Plovers, Golden Plovers and tiny Temminck's Stints traverse enormous distances (3000 to 7000 km) from their breeding grounds in extreme North Siberia to their wintering places in India.

Common and Demoiselle Cranes migrate from Central Siberia.

A small group of the rarest Siberian Cranes visit only Bharatpur (Rajasthan) from North and East Siberia.

Ducks like Mallard, Pintail, Gargeny migrate from Central and South Siberia covering long distances (3000 to 7600 km.).

Rosy Pastors and Buntings arrive from Middle East countries.

Bird-ringing/Bird-banding

One of the ways by which scientists can find out about migratory patterns of birds is Bird Ringing or Bird Banding.

bird-ringing consist of trapping birds alive, inserting metal rings/bands in their legs, and then releasing them. Light weight rings of various sizes made from aluminum alloys are used for this purpose. The sizes of these rings are standardized. Serial number and the name of the institution doing the banding are embossed on each ring.

Nylon nets made of very fine mesh are generally used for trapping land birds. These nests are tied to two poles. Many such nets are fixed at a time in an area selected for ringing operations. These are located at strategic places where birds have to turn either right or left while flying swiftly.

These nets are so fine that they are not conspicuous from a distance. When a flying bird strikes the net, it is trapped. The more it struggles to come out, the more it gets entangled in the net. Persons concluding a ringing camp visit each net of the area at a fixed intervals say of 15 minutes. They gently extricate the birds caught in each net, taking care to avoid any injury to them, and put one bird each into a small cotton bag.

The birds are then taken out of the bag and weighed. A ring of appropriate size is gently inserted in each one's leg. Details of ringed birds such as name, sex (if discernible) adult or juvenile, weight, serial number of the ring, name of the place where ringed, the date of ringing etc. are noted down in a special register or sheet. Thereafter the bird is released.

In India, ringing though started in 1926 by Bombay Natural History Society, did not make much headway till 1960. From then on, lakhs of birds have been ringed. These are mainly waders, wagtails and ducks. Some places where ringing is regularly carried out are Keoladev Ghana of Bharatpur, Pt. Calimere (Tamil Nadu), Ranns and dhandhs of Kachchh.

Bird-ringing is very useful in more ways than one. It helps to know from where the migrants come; the routes they generally follow; time taken in the journey; distance covered; age of birds in the wild; fidelity to the place of sojourn; and speed of migratory flight.

Let us see how this helps.

Countries: As a result of ringing operations, we know definitely the countries from where our winter migrants come. Most of these migrate from the north, north-west and north-east area of the erstwhile U.S.S.R. (Siberia, Kazak, Uzbek, Caucas region and beyond), as well as from Eastern Europe Russia and as far west as Germany and Italy. A young osprey hardly four months old was recovered in Jamnagar district (Gujarat). It was ringed while a chick in Norway. This probably is the first record of a bird migrating from Norway to India.

Routes: Normally the birds are known to travel via river valleys. But some instances have shown that to shorten the routes, they may cross over the high mountain ranges including the Himalaya. three dead Steppe Eagles were found on the South Col (7925m) by an Everest Expedition. A Temminck's Stint, one of our smallest waders, was found in the Everest region at 5200m and Greylag and Barheaded Geese have been observed flying at over 4270m across the Himalaya.

Time taken in the journey: a Wood Sandpiper ringed near Calcutta on 6-4-67 was recovered on 24.5.67 at a place 6200km away. This period of 48 days could be less considering the likelihood that it might have dallied for some days after ringing, or might not have been recovered on the very day it reached the place.

Fidelity to the place of sojourn: there are instances of birds unerringly coming to the same little area every year. A Lesser Whitethroat, an Orphean Warbler and a Wryneck ringed in Hingolghadh (Saurashtra) were recaptured at the same place almost exactly after a year.

Distance Covered:

Many of our ducks and waders traverse distances of 3000 to 7700 km. For example, a Gergeny ringed in Bharatpur (Rajasthan) and another ringed in Tanjavur (Tamil Nadu) were recovered in Italy (7600 km away), and near Kano in Nigeria (7700 km away) respectively.

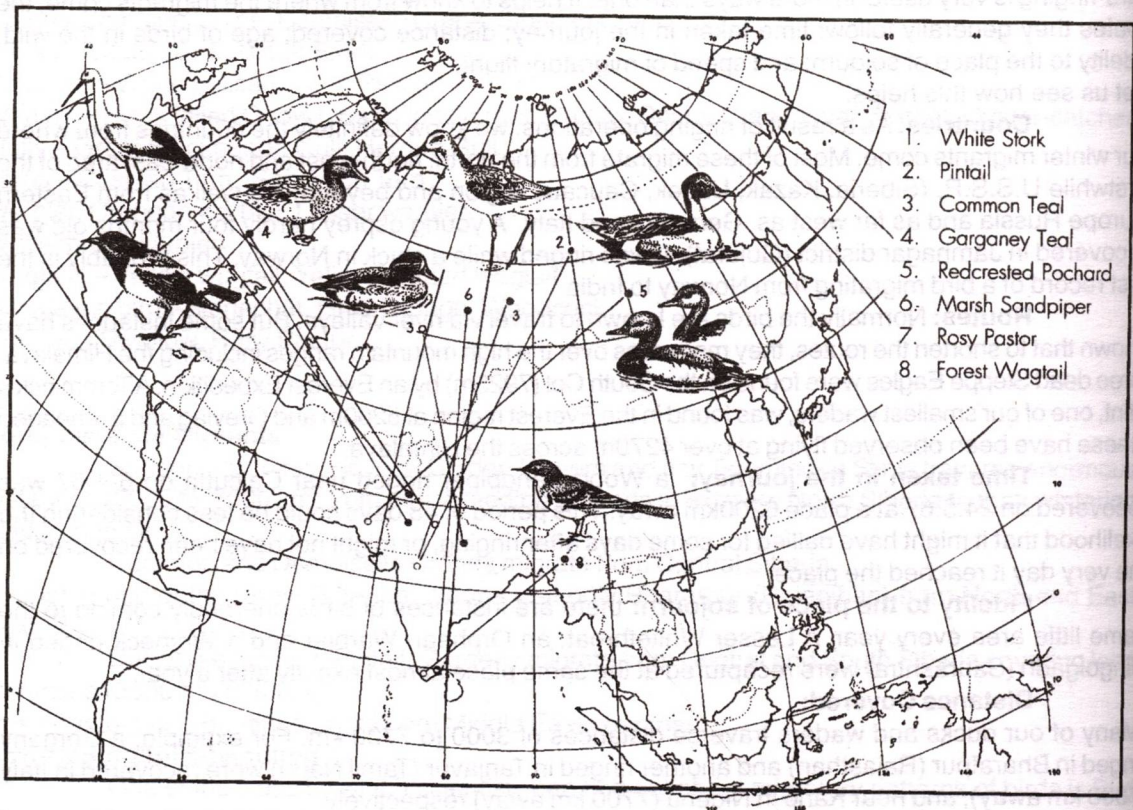
Age: Bird-ringing, though originally started for collecting information regarding migration is useful in widening our knowledge of various other aspects of birdlife, such as the life span of birds in the wild. A Redvented Bulbul, ringed at Hingolghadh in Saurashtra was captured again after 12 years from the same place.

This can help to surmise that the lifespan of a Redvented Bulbul could be even longer than 12 years.

Speed of flying: The speed of migratory flight of Mallards has been estimated at 80 km. per hour.

India is a large country and has countless sites where ringing could be very successfully carried out. This includes a long coastline, extensive mud floats and wetlands, and many small and big lakes all over the country where migratory water birds gather in good numbers during winter.

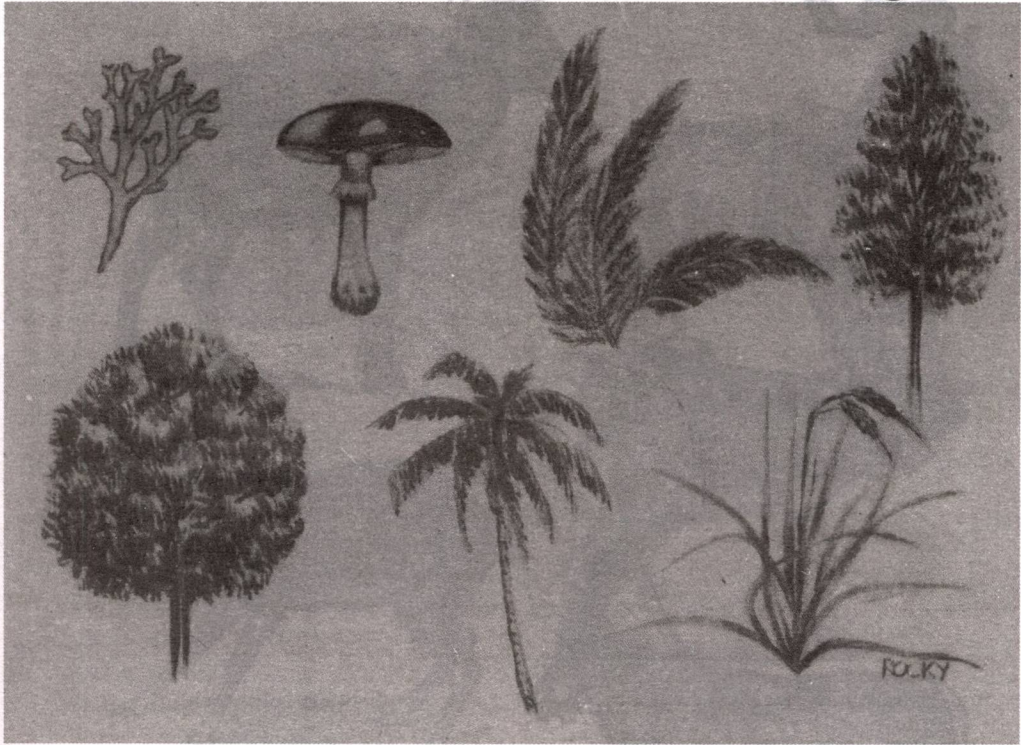
Migration Map of Indian Subcontinent



Source: Salim Ali, *The Book of Indian Birds*, Bombay Natural Hisotry Society, Oxford University Press, 1996

Courtsey : CEE's Nature Scope-India- Birds, Birds, Birds

धरती में पेड़-पौधों की उत्पत्ति कब हुई?



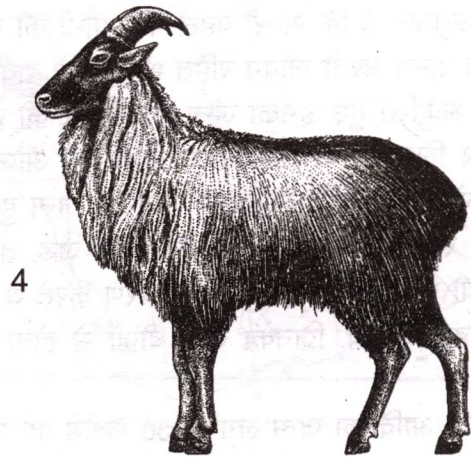
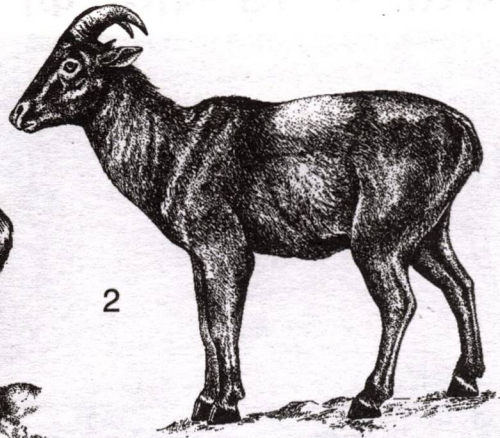
वैज्ञानिकों का अनुमान है कि सबसे पहले पेड़-पौधों की उत्पत्ति अब से लगभग दो अरब वर्ष पहले समुद्र में हुई थी, उस समय धरती जीवन रहित थी, इसके बाद लगभग 42.5 करोड़ वर्ष पहले कुछ छोटे-छोटे पौधे धरती पर अंकुरित हुए, इनका जन्म एक प्रकार की समुद्री घास (Algae) से हुआ था, ये पौधे मॉस (Moss) और लिवरपर्ट से मिलते-जुलते थे, जो आज अंधेरे और गीले स्थानों में उगते हैं।

लगभग 40 करोड़ वर्ष पूर्व कुछ जटिल पौधों का जन्म हुआ जो आज के फर्न (Ferns), होर्सटेल्स और क्लबमॉस से मिलते-जुलते थे। फर्न पहले जड़, तना और पत्तियों वाले पौधे थे।

जिन दिनों पृथ्वी पर विशाल डायनोसोर विचरण करते थे, उन दिनों फर्न्स के बहुत बड़े-बड़े जंगल पृथ्वी पर थे। यह पहले वृक्ष थे, जिनका जन्म बीजों से होता था।

देवदार और चीड़ आदि का जन्म लगभग 30 करोड़ वर्ष पहले हुआ इनके बीज शंकु के आकार की रचना में थे, सारे पर्वत प्रदेश इन वृक्षों से ढके हुए थे।

लगभग 15 करोड़ वर्ष पहले फूल वाले पेड़-पौधों का जन्म हुआ। इन पौधों के बीज आवरण से ढके हुए थे। धीरे-धीरे इनकी किस्में और संख्या बढ़ती गई आज तो फूल वाले पौधे सभी जगह दिखाई देते हैं। इस प्रकार धरती पर अनेक प्रकार के पेड़-पौधों का विकास हुआ।

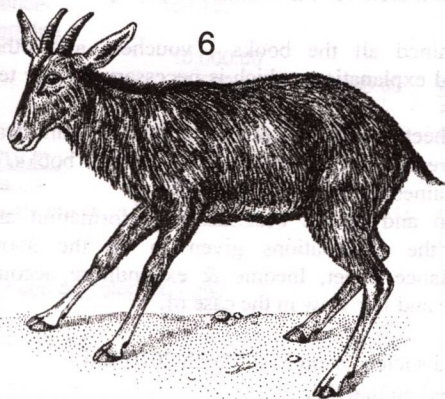
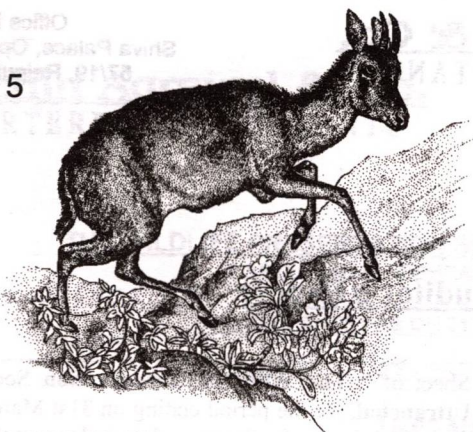


1. The Markhor *Capra falconeri* **Local Name** Punjab and south Kashmir markhor; Ladaki rephoche (male) rawache (female)

2. The Nilgiri Tahr *Hemitragus hylocrius* **Local Names** Tamil and kan, varat adoo; Mal. mulla atu; English Nilgiri Ibex

3. The Ibex *Capra ibex* **Local Names.** Ladaki skin or sakin (male), dabmo or danmo (female); Kash. Kail; Kulu tangrol

4. The Himalayan Tahr *Hemitragus jemlahicus* **Local Names** Western Himalayas tehr, jehr; Kash. kras, jagla; Nepali jharal



5. The Goral *Nemorhaedus goral* Local Name NW himalayas goral; Kash. ptj. ptjur, rat rom; Sikkim Bhotia ra gtyu; Assamese deo chagal.

6. The Chiru, or Tibetan Antelope *Pantholops hodgsoni* Local Names Tibetan tsus(male) chus(female) chiru, chuku

7. The Serow *Capricornis sumatraensis* Local names NW Himalayas saroo; Kash. ramu, half salabhir; Sikkim gya' Bur. taut tshiek; Malay kambing utan

8. The Takin *Budorcas taxicolor*



Sachin Agrawal & Co.
CHARTERED ACCOUNTANTS

Office No. 18, First Floor,
Shiva Palace, Opposite Secretariat,
57/19, Rajpur Road, Dehradun.

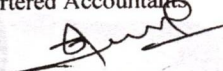
Auditor's Report

We have examined the Balance Sheet of " **The Wild Life Preservation Society of India, 7 Astley Hall, Dehradun, Uttranchal**, for the period ending on 31st March 2010 and Income & Expenditure account annexed thereto for the same date and report that:

1. We have obtained all the books , vouchers and other information and explanations which is necessary for our test check.
 2. The Balance Sheet and Income & Expenditure account dealt with by this report are in agreement with the books of accounts maintained by the said society.
 3. In our opinion and to the best of our information and according to the explanations given to us the above mentioned Balance Sheet, Income & expenditure account represent a true and fair view in the case of:
- Balance Sheet of the said society as on 31st March 2010 and
 - Surplus for the year ended on that date.

For Sachin Agrawal & Co.
Chartered Accountants




Sachin Agrawal
CA. Men.: No. 078414

Date: 17.04.2010

Place: Dehradun



Sachin Agrawal & Co.

CHARTERED ACCOUNTANTS

Office No. 18, First Floor,
Shiva Palace, Opposite Secretariat,
57/19, Rajpur Road, Dehradun.

THE WILDLIFE PRESERVATION SOCIETY OF INDIA

7 ASTLEY HALL, DEHRADUN

BALANCE SHEET AS ON 31.03.2010

LIABILITIES	AMOUNT	ASSETS	AMOUNT
CAPITAL FUND		FIXED ASSETS	
Opening Balance	109,136.00	[as per schedule]	159,290.00
Add : Life Mem fee			
Other	10,000.00		
Institutional	38,500.00		
	157,636.00	INVESTMENTS	
		FDR with PNB	84,798.00
		Intt Accrued on FDR	1,322.00
			86,120.00
GENERAL FUND :		CURRENT ASSETS :	
Opening Balance	(33,100.71)	Cash in hand	2,000.00
Add : Surplus for the yr	32,141.00	PNB 650780	
	(959.71)	Astley Hall, Dehradun	60,861.29
			62,861.29
Wild Life Up Keep & Protection Fund		Security Deposits :	
Last Balance	300,000.00	Electricity	40.00
Less : Trnfd to I&E A/c	150,000.00	Water	20.00
	150,000.00		60.00
Professional Charges payable	1,655.00		
Total Rs....	308,331.29	Total Rs....	308,331.29

Dated : 17.04.2010

President

Ex-Vice President
WLPSI Dehradun.

Secretary

Hony. Secretary
WLPSI Dehradun.

Treasurer

Hony. Treasurer
WLPSI Dehradun,

Refer to our audit report of even date ,

for Sachin Agrawal & Co.
Chartered Accountants



[CA Sachin Agrawal - FCA]
Mem no 078414



Sachin Agrawal & Co. **CHARTERED ACCOUNTANTS**

Office No. 18, First Floor,
Shiva Palace, Opposite Secretariat,
57/19, Rajpur Road, Dehradun.

THE WILDLIFE PRESERVATION SOCIETY OF INDIA

7 ASTLEY HALL, DEHRADUN

INCOME & EXPENDITURE ACCOUNT FOR THE YEAR ENDING 31.03.2010

EXPENDITURE	AMOUNT	INCOME	AMOUNT
Printing of Cheetal Magazine	70,970.00	Membership Fee	
Printing & Stationery	1,944.00	Annual	6,550.00
Postage & Telegram	14,629.00	Student	700.00
House, water and sewer tax	280.00	Institutional	6,770.00
Electricity charges	731.00		
Sweeper Wages	3,000.00	Donation	33,700.00
Office Expenses	151.00		
Honorarium	26,000.00	Intt on SB a/c	2,784.00
Honorarium - Computer operator	32,000.00		
Repair & Maintenance	3,000.00	Royalty Received	2,254.00
Entertainment Expenses	163.00		
Telephone Expenses	2,812.00	Sale of Cheetal Book	50.00
Audit Fee	1,655.00		
Conveyance Allowance	390.00	Intt on FDR (Accrued & recd)	7,693.00
Tours & Travels	2,700.00		
Bank Charges	160.00	Fund transferred from wild life upkeep & Protection fund	150,000.00
Depreciation as per schedule	17,775.00		
Surplus for the year	32,141.00		
Total Rs....	210,501.00	Total Rs....	- 210,501.00

Dated : 17.04.2010

President

Ex-Vice President
WLPSI Dehradun.

Secretary

Hony. Secretary
WLPSI Dehradun.

Treasurer

Hony. Treasurer
WLPSI Dehradun,

Refer to our audit report of even date.

for Sachin Agrawal & Co.
Chartered Accountants



CA Sachin Agrawal - FCA
Mem no 078414



Sachin Agrawal & Co. **CHARTERED ACCOUNTANTS.**

Office No. 18, First Floor,
 Shiva Palace, Opposite Secretariat,
 57/19, Rajpur Road, Dehradun.

THE WILDLIFE PRESERVATION SOCIETY OF INDIA

7 ASTLEY HALL, DEHRADUN

SCHEDULE OF FIXED ASSETS AS ON 31.03.2010

Particular	Balance as on 01.04.2009	Addition	Total	Depreciation	Balance as on 31.03.2010
Building	175,473.00	-	175,473.00	17,547.00	157,926.00
Library Books	620.00	-	620.00	93.00	527.00
Furniture & Fixture	218.00	-	218.00	22.00	196.00
Typewriter	754.00	-	754.00	113.00	641.00
Total	177,065.00	-	177,065.00	17,775.00	159,290.00

Dated : 17.04.2010

President

Ex-Vice President
WLPSI Dehradun.

Secretary

Hony. Secretary
WLPSI Dehradun.

Treasurer

Hony. Treasurer
WLPSI Dehradun,

Refer to our audit report of even date ,

for Sachin Agrawal & Co.
 Chartered Accountants



Sachin Agrawal - FCA]
 Mem no 078414

COMPUTATION OF INCOME

NAME

THE WILD LIFE PRESERVATION SOCIETY OF INDIA

ADDRESS

**7 ASTLEY HALL,
DEHRADUN**

STATUS

ASSOCIATION OF PERSON

PREV YEAR

2009-2010

ASSTT YEAR

2010-2011

PAN NO

AABTT5162F

ASSESSED TO

CIRCLE -2, DEHRADUN

INCOME FROM BUSINESS :

Surplus (Deficit) as per income & expenditure account

32,141.00

Gross Total Income

32,141.00

Say Rs

32,141.00

Tax on above

Tax Deducted At Source

Refundable

RETURN OF FBT :

Since there is no employee in the society,
Therefore the provisions regarding FBT are not applicable to it.

**Hony. Secretary
WLPSI Dehradun.**

The Wildlife Preservation Society of India

1. The aims and objects of the Society are as follows :-

- (a) To promote interest and impart knowledge regarding the preservation and conservation of all forms of wildlife, particularly among the youth of the country.
- (b) To cooperate with the Govt. of India and State Governments and with others Societies and Institutions having similar aims and objects in working for the interests of wildlife.
- (c) To assist in enforcing and actively supporting the Forests Acts. Wild Birds and animals Protections Acts and Rules etc. of State Governments and the Indian Arms Act and Rules in so far as they pertain to wildlife and to bring to the notice of the authorities any infringement of the same and to assist in the detention and prosecution of offenders in respect of such laws.
- (d) To advise and help the Govt. and wildlife administrators in the formation, maintenance and protection of Sanctuaries and National Parks, preservation of wildlife in general and endangered species of India in particular and in the introduction of exotic species into the country, rehabilitation of endangered species etc. and in the formulation and amendments of rules and acts, so as to conserve and increase wildlife stocks.
- (e) To raise funds for carrying out the above aims and objects and to found and maintain museums reading rooms and libraries of natural history in order to disseminate knowledge regarding wildlife.
- (f) To carry out publicity and propaganda for the preservation of wildlife in India by means of monographs, journals, films, filmstrips and other feasible methods.
- (g) To assist members of the Society in obtaining facilities for viewing and photographing wildlife in India.
- (h) To conduct research into the problem of Wildlife management in India, and in pursuance of this, to initiate, encourage and, where possible assist in the projects of the study of threatened species and related objects and to provide reference and research facilities for such work.
- (i) To carry on such other activities which will serve the above subjects.

2. What membership of Wildlife Preservation Society of India will entitle you to ?

- (1) You will become an active member of the growing group of Wildlife enthusiasts, who enjoy working for and spreading the knowledge of how to conserve India's heritage of wildlife for posterity.
- (2) You will be entitled to the full use of the library of the Wildlife Preservation Society and of its reading room.
- (3) You will receive a membership certificate.
- (4) You will receive a personal Identification and Membership Card.
- (5) You will be entitled to buy all publications of the Society at a concessional rate.
- (6) You will be entitled to buy at concessional rates the Societies Greeting Cards, Calendars. Tie, Label badges and the Balance of Nature Game (specially Published in colour for its educative and recreational values).
- (7) You will be supplied "Cheetal", the quarterly journal of the society free.

3. For membership particulars write to Honorary Secretary, Wildlife Preservation Society of India 7 Astley Hall, Dehra Dun.

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